PB82-129958

Jacksonville Electric Authority St. Johns River Power Park. FDER State Analysis Report

(U.S.) Environmental Protection Agency
Atlanta, GA

Prepared for

Florida State Dept. of Environmental Regulation
Tallahassee

Oct 81

U.S. Department of Commerce
National Technical Information Service
NTIS

PB82-129958

United States
Environmental Protection
Agency

Region 4
345 Courtland Street, NE
Atlanta, GA 30365

EPA 904/9-81-088
October 1981

EPA Environmental Impact Statement

Draft

FDER State Analysis Report

PA 81-13

Jacksonville Electric Authority
St. Johns River Power Park

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Jacksonville Electric Authority and Florida Power and Light Company propose to jointly construct and operate a New Source 1,200 megawatt coal-fired steam electric generating station known as the St. Johns River Power Park on a 1,656 acre site in northern Duval County, Florida. This document assesses the proposed project and alternatives with respect to impacts on the natural and man-made environments. Potential mitigative measures are also evaluated.

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JOINT PUBLIC NOTICE
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV, CONSOLIDATED PERMITS BRANCH
345 Courtland St., N. E.
Atlanta, Georgia 30365

in conjunction with

Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301

Public Notice No. PH81FL196 October 29, 1981

NOTICE OF PUBLIC HEARING

ON

FLORIDA STATE ANALYSIS REPORT/DRAFT ENVIRONMENTAL IMPACT STATEMENT; NOTICE OF PROPOSED ISSUANCE OF NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT; NOTICE OF REVISED PRELIMINARY DETERMINATION REGARDING PREVENTION OF SIGNIFICANT DETERIORATION; AND NOTICE OF CONSIDERATION FOR STATE CERTIFICATION OF THE NPDES PERMIT.

A jointly prepared Florida State Analysis Report and Draft Environmental Impact Statement (SAR/EIS) on the proposed St. Johns River Power Park will be made available by the Environmental Protection Agency (EPA) to the public on or about October 30, 1981. Jacksonville Electric Authority and Florida Power and Light Company propose to jointly construct a 1200 megawatt coal-fired power plant on a 1,656 acre site in northern Duval County. Although the project is jointly proposed, Jacksonville Electric Authority is the applicant for permits.

In order to solicit further public participation on the proposed issuance of necessary permits and determinations for the proposed project, a public hearing will be held. The hearing is scheduled for December 1, 1981, and will begin at 7:00 p.m. in the Jacksonville City Health Department Auditorium, 515 West 6th Street (corner of 6th and Broad Streets). The hearing panel will include representatives from EPA and the State of Florida.

Both oral and written comments will be accepted and a transcript of the proceedings will be made. For the accuracy of the record, written comments are encouraged. The Hearing Chairperson reserves the right to fix reasonable limits on the time allowed for oral statements.

The U.S. Environmental Protection Agency proposes to issue a National Pollutant Discharge Elimination System (NPDES) Permit to Jacksonville Electric Authority, 233 West Duval Street, Jacksonville, Florida 32201 for the St. Johns River Power Park, 11201 New Berlin Road, Jacksonville, Florida 32226, NPDES No. FL0037869. The application describes two proposed discharges from construction and operation of the plant, which will generate and transmit electricity (SIC Code 4911), into the St. Johns River and Browns Creek. The receiving waters are classified as Class III - Recreation - Propagation and Management of Fish and Wildlife - Surface Waters.

The proposed NPDES Permit contains limitations on the amounts of pollutants allowed to be discharged and was drafted in accordance with the provisions of the Clean Water Act (CWA, 33 U.S.C. Section 1251 et seq.) and other lawful standards and regulations. The pollutant limitations and other permit conditions are tentative and open to comment from the public both in writing and at the public hearing.

A fact sheet which outlines the proposed discharges and EPA's proposed pollutant limitations and conditions are available by writing or calling the EPA. A copy of the draft Permit and Permit Rationale is included as an appendix to the SAR/EIS and is also available from EPA. The administrative record, including the application and supporting information, draft Permit, fact sheet, SAR/EIS, comments received, and other information are available for review and copying at 345 Courtland Street, 2nd floor, Atlanta, Georgia, between the hours of 8:15 a.m. and 4:30 p.m., Monday through Friday. A copying machine is available for public use at a charge of 20¢ per page.

The EPA also proposes to issue a Prevention of Significant Deterioration (PSD) Approval to Construct the Air Emissions Source according to the rules for the Prevention of Significant Deterioration of Air Quality (40 CFR 52.21). A public notice on the Preliminary Determination was originally released on January 28, 1981, and is renoticed in this public notice. A copy of the revised Preliminary Determination is included as an appendix to the SAR/EIS. It also may be obtained by contacting EPA.

The Florida Department of Environmental Regulation has been requested to certify the discharges in accordance with the provisions of Section 401 of the CWA (33 U.S C. Section 1251 et seq.). Comments on issuance of certification must be submitted to Mr. Hamilton S. Oven, Jr., Administrator of Power Plant Siting at the State Agency address above within thirty (30) days of the date of this public notice. The State Agency will be represented on the hearing panel in order to receive comments relative to State Certification.

Persons wishing to comment upon or object to the SAR/EIS, the PSD, NPDES Permit issuance, the proposed NPDES Permit limitations and conditions, or the State Certification of the NPDES Permit are invited to respond in writing by December 14, 1981, to the U. S. Environmental Protection Agency, 345 Courtland St., N. E., Atlanta, Georgia 30365, ATTENTION: Mr. John E. Hagan, III, Chief, EIS Branch. The NPDES number FL0033869 should be included on the first page of comments. All comments received by December 14, 1981, will be considered in the formulation of final determinations regarding the Final EIS, the NPDES Permit, NPDES Permit conditions and limitations, the PSD Final determinations, and the State Certification of the NPDES Permit.

A Final EIS will be published after the close of the public comment period. The Final EIS will consist of a summary of the SAR/EIS, the Agency's tentative decision on issuance of the NPDES Permit on this project, responses to comments received on the SAR/EIS, the transcript of the public hearing (or a summary thereof), and any other relevant information or evaluations developed after publication of the SAR/EIS. A copy of the SAR/EIS should be retained if a complete evaluation of the project is desired.

After consideration of all written comments and of the requirements and policies in the CWA and appropriate regulations, the EPA Regional Administrator will make determinations regarding NPDES Permit issuance. If the determinations are substantially unchanged from those announced by this notice, the EPA Regional Administrator will so notify all persons submitting written comments. If the determinations are substantially changed, the EPA Regional Administrator will issue a public notice indicating the revised determinations. Requests for an evidentiary hearing may be filed after the Regional Administrator makes the above-described determinations. Additional information regarding evidentiary hearings is available in 40 CFR Subpart E, 45 FR 33498 (May 19, 1980), or by contacting the Legal Branch at the address above or at 404/881-3506.

Copies of the SAR/EIS, which includes the draft NPDES Permit and revised Preliminary Determination for the PSD are available for review at the following locations:

St. Johns River Sub-District Office   Jacksonville, FL
Florida Department of Environmental
Regulation
3426 Bills Road

Jacksonville Public Library 24 N. Ocean Street	Jacksonville, FL
University of North Florida Library Building 12, 4567 St. Johns Bluff Road	Jacksonville, FL
Clay County Public Library 57 West Ferris Street	Green Cove Springs, FL.
Clay County Library (Orange Park Branch) 2054 Plain Field Avenue	Orange Park, FL
St. Johns County Library 12 Aniles Street	St. Augustine, FL
Nassau County Library (Fernandina Branch) 24 North Fourth Street	Fernandina Beach, FL.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

October 22, 1981

To: All Interested Agencies, Public Groups and Citizens

This Draft Environmental Impact Statement and State Analysis Report (SAR/EIS) on the proposed St. Johns River Power Park is provided for your review. The joint document has been prepared to satisfy both the requirements of USEPA under the National Environmental Policy Act and of the Florida Department of Environmental Regulation under the Florida Power Plant Siting Act.

A 45-day review period officially begins on October 30, 1981 when the availability of the SAR/EIS will be announced in the Federal Register. Comments on this document and the proposed actions will be appreciated.

Detailed information supporting the assessments and conclusions of the SAR/EIS is contained in a separate Technical Reference Document (TRD). While the SAR/EIS is a complete document, the TRD is part of the record on this project. A limited number of copies are available for review.

EPA 904/9-81-088
NPDES Application Number:
FL 0037869

Florida Power Plant Siting
Application Number:
PA 81-13

Draft
Environmental Impact Statement for Proposed Issuance of a New Source National Pollutant Discharge Elimination System Permit

Florida State Analysis Report for Proposed Certification by the Governor and Cabinet

to
Jacksonville Electric Authority
St. Johns River Power Park

Jointly Prepared by:
U.S. Environmental Protection Agency
and
Florida Department of Environmental Regulation

Jacksonville Electric Authority and Florida Power and Light Company propose to jointly construct and operate a New Source 1,200 megawatt coal-fired steam electric generating station known as the St. Johns River Power Park on a 1,656 acre site in northern Duval County, Florida. This document assesses the proposed project and alternatives with respect to impacts on the natural and man-made environments. Potential mitigative measures are also evaluated.

The comment period will end on December 14, 1981.

Comments or inquiries should be directed to:

F. Theodore Bisterfeld
EIS Project Officer
U.S. EPA, Region IV
345 Courtland St., N.E.
Atlanta, Georgia 30365
(404) 881-7458

Hamilton S. Oven, Administrator
Power Plant Siting
Florida DER
2600 Blair Stone Road
Tallahassee, Florida 32301
(904) 488-0130

Approved by:

Charles R. Jeter
Charles R. Jeter
Regional Administrator

10/9/81
Date

i (f)

EXECUTIVE SUMMARY

ENVIRONMENTAL IMPACT STATEMENT
AND STATE ANALYSIS REPORT

St. Johns River Power Park
Jacksonville Electric Authority and
Florida Power and Light Company

(X) Draft
( ) Final

US Environmental Protection Agency, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Florida Department of Environmental Regulation
Power Plant Siting Section
2600 Blair Stone Road
Tallahassee, Florida 32301

1. Type of Action: Administrative (X) Legislative ( )

2. Description of Action

The Jacksonville Electric Authority (JEA) and Florida Power and Light Company (FP&L) propose to jointly construct and operate a New Source 1,200 megawatt (MW) coal-fired steam electric generating station known as the St. Johns River Power Park (SJRPP) on a 1,656-acre site in northern Duval County, Florida. JEA has applied to the US Environmental Protection Agency (USEPA), the Florida Department of Environmental Regulation (FDER), and other Federal agencies for the permits necessary to construct and operate the proposed facility.

This joint document has been prepared to satisfy both the requirements of USEPA under the National Environmental Policy Act (NEPA) and of FDER under the Florida Power Plant Siting Act. The USEPA Region IV Administrator has declared the proposed plant to be a New Source as defined by Section 306 of the Clean Water Act. Operation of the SJRPP would require a National Pollutant Discharge Elimination System (NDPES) Permit. Issuance of this Permit would be a major Federal action significantly affecting the quality of the human environment and subject to the provisions of NEPA. Consequently, USEPA decided that an Environmental Impact Statement (EIS) should be prepared. Because under the Power Plant Siting Act FDER is required to prepare a State Analysis Report (SAR) containing information similar to that required in an EIS, USEPA and FDER have entered into a Memorandum of Understanding agreeing to prepare a single document. This joint document will meet the responsibilities of both agencies.

The determination of need for a new steam electric generating facility in Florida is the responsibility of the Florida Public Service Commission (FPSC)

JEA and FP&L applied to FPSC for a certification of SJRPP Unit 1 in 1985 and Unit 2 in 1987. The need for SJRPP was argued in two ways: (1) additional capacity was needed to provide reliable electric service to their customers and (2) SJRPP would reduce electric rates through the displacement of expensive oil-fired power generation.

Although no need was found for the additional capacity provided by the SJRPP for 1985 or 1987, the need for economic displacement of oil as the utilities' primary boiler fuel was clearly established. It was estimated by the FPSC based on "expected case" economic assumptions that the SJRPP could save JEA $95,985,000 in 1986 and $235,055,000 in 1990 and that savings for FP&L could reach $29,604,000 and $125,717,000 in the same respective years. On 26 June, 1981, following the analysis of a variety of alternative energy sources and oil displacement technologies including purchase of power, conversion of oil-burning units to coal or coal-oil mixtures, and additional conservation, the FPSC certified the need for SJRPP Units 1 and 2 in the time frame proposed in that they appeared to be the best available alternative to displacing oil. With regard to the need for additional capacity, the FPSC found that considering the conservation goals established for Florida by the Florida Energy Efficiency and Conservation Act (FEECA), JEA would not need the additional generating capacity provided by the SJRPP until 1991 and FP&L would not need the additional capacity until 1989. Also, the FPSC determined that from the standpoint of electrical system reliability for peninsular Florida as a whole, the new units would not be required until 1991.

The St. Johns River Power Park site is located adjacent to the JEA Northside Generating Station (NGS) in northern Duval County adjacent to the St. Johns River. The present site consists of a nominal 1,656 acres of which a portion is not considered to be suitable for development. The property is primarily owned by the North Shore Corporation. Site boundaries include New Berlin Road to the west, the Jacksonville North Landfill to the north, and marshes to the east and south. Trees, shrubs, and grasses comprise the majority of the site, totalling approximately 1,307 acres. Wetlands comprise approximately another 289 acres. The site is crossed by transmission lines from the NGS as well as by the Seaboard Coast Line Railroad which serves Blount Island.

The proposed plant will consist of two 600 MW (550 MW net) coal-fired generating units and will be aligned along an axis running from northwest to southeast. The plant rail loop will be enclosed by the service rail which will form an oval loop around the plant structures. A common stack will be utilized by both units. Coal handling facilities to accommodate delivery of coal by rail and for coal storage will be located to the south of the plant rail loop. A proposed coal barge unloading facility will occupy approximately 55 acres of land on Blount Island. The major coal handling facilities on Blount Island are the ocean vessel coal unloading wharf, the stacker-reclaimer and coal storage pile, the railcar loading area, emergency coal stackout, and a runoff sedimentation basin and percolation pond. The coal unloader and wharf will be the only structures on or waterward of the mean high water (MHW) line.

The SJRPP will burn approximately 3,500,000 tons of coal per year. Coal will be delivered to the site either by 72 car unit trains or by shuttle train from the Blount Island coal unloading facility. Particulate emissions from the boilers will be controlled by the use of electrostatic precipitators (ESP) with 99.78% efficiency. Sulfur dioxide (SO_2) emissions will be controlled to a 90% level by the use of an FGD limestone scrubber system. The formation of nitrogen oxides and carbon monoxide during combustion would be inhibited by the design and proper operation of the proposed boiler, furnace, and combustion air control system. Emissions of fugitive dust from coal handling and storage will be controlled by the use of enclosed conveyors, fabric filters at transfer points, and wetting of open storage areas. Fugitive dust from cooling tower drift will be minimized by the use of drift eliminators.

Waste heat will be dissipated by two natural draft cooling towers. Approximately 49.5 million gallons per day (mgd) of makeup water will be withdrawn from the NGS discharge channel and an average of 35 mgd of blowdown will be returned to the NGS discharge channel just downstream of the SJRPP intake. During operation all wastewater effluent and runoff from the site also will be discharged to the NGS discharge channel. Approximately 2.1 mgd of groundwater will be used at the plant to operate the FGD system and provide service and process water. Bottom ash will be sluiced to dewatering bins; subsequently, the dewatered waste material will be disposed of on-site. Fly ash would be collected dry in electrostatic precipitators (ESP's) and sold or landfilled on-site. High quality gypsum (calcium sulfate) generated as a by-product of the FGD system would be handled and stored on-site. Revenues from the sale of by-product gypsum would be applied as a credit against the expense of fuel for SJRPP (Breitmoser 1981b). The on-site storage of this by-product would be either short- or long-term depending on its marketability.

Transmission lines associated with the proposed plant will terminate at the Normandy Substation on the west side of Jacksonville and at the Fort Caroline and Robinwood Substations to the east of Jacksonville. Transmission lines will be routed within the proposed preferred corridor. The majority of preferred corridor includes an existing transmission line right-of-way (ROW). Where it is feasible from an engineering, environmental, and system reliability standpoint, the final new ROW will be located parallel and adjacent to the existing ROW. A preliminary estimate is that this should occur in over 90% of its length. The new ROW will normally be 150 feet to 200 feet in width.

3. Major Plant Systems Alternatives

Alternative Sites

Alternatives were considered for every major aspect of the project including sites and plant facilities. Beginning in 1977, a detailed siting analysis was performed to identify potential sites and to assess their environmental and engineering suitability for a 1,200 MW coal-fired power plant. An initial screening yielded 20 candidate sites which were further evaluated on more specific environmental and engineering criteria and thereby reduced to six. During the following three years a series of sites were evaluated. Although two sites in Clay County (Willis Point and Walkill) were judged to be potentially more suitable, the JEA Board selected a site in Duval County known as the Eastport Site because of the economic benefits and the potential unavailability and/or political opposition faced by JEA in the selection of either of the Clay County sites.

Cooling Systems

Cooling systems alternatives included the water source, the heat dissipation system, and the discharge receiving body. Natural draft and mechanical draft cooling towers were evaluated for heat dissipation. The natural draft towers were selected because of their energy efficiency and reduced potential for ground fogging. Cooling water source alternatives include groundwater, direct withdrawal from the St. Johns River, and reuse of cooling water from the once-through cooling system serving JEA's Northside Generating Station (NGS). Because of the reduced impingement, entrainment, and dredging effects and reduced costs associated with construction, the NGS discharge was selected as the makeup source for the SJRPP cooling system. Because of the reduced costs and the reduced construction and operational environmental effects on the River, the NGS discharge channel was also selected as the blowdown discharge point.

Air Pollution Control Systems

Air emissions control system alternatives were evaluated considering the state of the art of emission control technology, environmental impacts, and economics. Major sulfur dioxide (SO_2) control alternatives included regenerative reactant systems, lime spray dryer and lime/limestone scrubber systems. Based on the current status of the technology, cost, and the availability of the raw material, the limestone scrubber technology was selected. Major particulate control alternatives included fabric filters and electrostatic precipitators (ESP). Based on the lack of experience with fabric filters (as applied to power plants) and cost factors, the ESP technology designed to meet BACT standards was selected. Other boiler emissions (e.g., NOx, and CO) will be controlled by boiler design.

Water/Wastewater Systems

Groundwater and surface water were considered as alternative sources of makeup water for plant systems. Because the utilities hope to be able to market their high volume solid wastes, groundwater was deemed preferable to surface water as the source of makeup to the FGD and bottom ash sluicing systems. The use of saline water from the St. Johns River would result in excessive chloride contamination of the by-products. Wastewater systems were designed to recirculate and reuse water throughout the plant wherever possible and the NGS discharge channel was selected as the preferred discharge point. Chlorine, bromine chloride, and ozone were considered for control of biological growths in the cooling system. Although ozone and bromine chloride exhibit promising characteristics as biocides, chlorination with very careful control of residual oxidants was selected because of reduced cost and greater operating experience.

Solid Waste Systems

Alternative systems for the handling and disposal of high volume solid wastes (bottom ash, fly ash, and FGD sludge) were considered. Originally wet sluicing to a bottom ash pond was selected as the preferred method of handling bottom ash, but this was later changed to wet sluicing, dewatering, and dry landfill disposal because of concerns over potential groundwater contamination. Because fly ash is collected dry in the ESP's, continued dry handling and disposal was preferred to wet sluicing with its associated wastewater stream. Alternatives considered for management of FGD sludge included on-site landfilling and sale as a by-product. The utilities intend to market the sludge (gypsum) if possible, but due to uncertainties about its final quality it may have to be landfilled on-site. It is proposed that a five-year test program be conducted to determine how best to dispose of unmarketable FGD sludge and other high volume wastes.

Plant Orientations

Two major alternative orientations for the plant rail loop were considered. Both were determined to impact wetlands on the site, but the north-south orientation was selected over the east-west orientation due to its relatively smaller degree of impact.

4. Alternatives to the Proposed Project

Section 1502.4 of the implementation regulations for NEPA require that all reasonable alternatives to the proposed action be considered in the EIS process. The FPSC evaluated several means of achieving oil savings in its certification of the need for the project. Other reasonable alternatives involving combinations of various cost-effective oil displacement technologies also exist. Independent engineering, economic, and environmental studies were conducted to identify, develop, and evaluate alternatives which meet the basic economic goals on which the SJRPP was justified. A major difference between the alternatives developed for the SAR/EIS and the proposed project is that they do not in all cases provide additional capacity, and none of them provide additional capacity equal to that provided by the SJRPP. The alternatives were selected based on their ability to meet the following objectives:

- the alternative would replace or save oil equivalent to or more than the oil saved by the proposed project;
- the alternative must replace an amount of oil for each utility (JEA and FP&L) equivalent to the oil displaced by the proposed coal-fired power plant;
- the alternative must not result in any loss of capacity to either utility; and
- the alternative must be implementable within the proposed time frame of the SJRPP project(1987).

Based on these criteria, the following four alternative power systems plus the No Action Alternative were developed for evaluation in the SAR/EIS.

Alternative 1

Alternative 1 consists of constructing refuse-fired power plants in Duval, Brevard, Seminole, Sarasota, and Manatee Counties, conversion of JEA's Northside Units 1 and 3 from oil-burning to a coal-oil mixture, utility sponsored installation of residential solar water heaters in the JEA and FP&L service areas, purchase by JEA and FP&L of a portion of Georgia Power's Vogtle

Nuclear Plant, and construction of 150 miles of transmission lines from Georgia to Florida. This alternative would result in oil savings of 5.4 million barrels per year by FP&L and 5.9 million barrels per year by JEA. It would increase the capacity of the FP&L system by 550 MW and the JEA system by 228 MW.

Alternative 2

Alternative 2 consists of conversion of FP&L's Sanford Units 4 and 5 from burning oil to coal-firing, purchase by JEA and FP&L of a portion of Georgia Power's Vogtle Nuclear Plant, and construction of 150 miles of transmission lines. In this alternative, JEA would rely solely on power purchase for oil displacement. This alternative would result in oil savings of 7.2 million barrels per year by FP&L and 5.9 million barrels per year by JEA. It would also increase the capacity of the JEA system by 550 MW and would not change the capacity of the FP&L system.

Alternative 3

Alternative 3 consists of conversion of FP&L's Sanford Units 4 and 5 from burning oil to coal-firing, purchase of a portion of Plant Vogtle, and construction of a 280 MW coal-fired power plant by JEA at the St. Johns River Power Park site. This alternative would result in oil savings of 7.2 million barrels per year by FP&L and 5.9 million barrels per year by JEA. It would increase the capacity of the JEA system by 550 MW and would not change the capacity of the FP&L system.

Alternative 4

Alternative 4 consists of conversion of FP&L's Sanford Units 4 and 5 and JEA's Northside Unit 3 from burning oil to coal and purchase by JEA and FP&L of a portion of Plant Vogtle. This alternative would result in oil savings of 7.2 million barrels per year by FP&L and 5.9 million barrels per year by JEA. It would also increase the capacity of the JEA system by 72 MW and would not change the capacity of the FP&L system.

5. Summary and Comparison of the Major Environmental Impacts of the Proposed Project and the Alternatives

Proposed Project

The proposed project will result both in construction and operation impacts on the human environment. Construction of the proposed project would result in the commitment of 1,656 acres of land at least for the 40 year life of the project and the elimination of approximately 883 acres of terrestrial habitat. This would include approximately 84 acres of valuable seasonally flooded wetland. An additional 120 acres of land would be committed to the new or expanded right-of-way (including a portion of undisturbed cypress wetland).

Approximately 550,000 cubic yards of sand and silt would be dredged from the Fulton-Dame Point Cutoff during construction of the Blount Island coal barge unloading facility. Contaminants in this material would be released into the River. Because ambient concentrations of several pollutants which are also found in the dredge spoils sometimes exceed Florida Class III water quality standards, short-term violations of water quality standards may occur outside of the mixing zone of the dredging operation.

An archaeological district has been identified on the proposed SJRPP site which is eligible for nomination to the National Register of Historic Places. Portions of this district will be destroyed or otherwise adversely impacted by construction of the proposed project.

The major operation impacts of the proposed project primarily affect air resources, the water quality of Blount Island Channel, and groundwater resources in the area. No violation of NAAQS or PSD increments is predicted for the Jacksonville area or the Okefenokee Swamp Class I area. However, a violation of the 24-hour SO_2 FAAQS was predicted to occur southwest of the JEA Southside Plant. JEA has not yet proposed a specific plan for mitigation of this impact.

Some drawdown of the Floridan Aquifer and increased long-term potential for chloride intrusion in the Aquifer would result from groundwater withdrawals at the SJRPP. Artesian and pumped wells close to the site would experience reductions in flow or yield. The solid waste disposal areas are not proposed to be constructed with impermeable liners. Therefore, seepage of trace pollutants from the solid waste disposal areas could potentially contaminate areas of the shallow water table aquifer on the SJRPP site and surface waters of Browns Creek down-gradient of the site. Discharges of wastewater and cooling tower blowdown from the SJRPP through the NGS discharge canal could violate State water quality standards in the Blount Island Channel for pollutants which already occasionally exceed these standards due to ambient conditions.

Comparison of Alternatives

An economic analysis of the alternatives was conducted to determine whether they meet the economic objectives of the SJRPP. Based on this analysis, it was concluded that Alternatives 2, 3, and 4 are competitive with SJRPP on an oil displacement and cost savings basis. These alternatives, particularly Alternative 2, rely heavily on the purchase of relatively inexpensive power from Georgia Power's Plant Vogtle. This plant has been steadily escalating in cost and may not, in the long run, be as economical as currently reported. Alternative 1 is prohibitively expensive for FP&L and for the utilities combined. None of the alternatives provide additional capacity equal to that provided by SJRPP. The cost of providing additional capacity at a later date was not factored into the analysis of the alternatives.

In the SAR/EIS the proposed project and the alternatives are evaluated and compared environmentally on a resource by resource basis. Within the limitations of the information available, the comparison has been conducted equally. The obvious differences in the level of detail and the broad economic and environmental assumptions required to make comparisons among the alternatives prevent the identification of any one overall alternative as being clearly superior. Nonetheless, certain generalizations regarding the environmental impacts of the No Action Alternative, SJRPP, and the four alternatives can be made.

As expected the No Action Alternative results in the fewest adverse environmental impacts. In comparing the action alternatives, it was generally found that the greater the magnitude of the alternative, the greater the degree of both beneficial and adverse environmental impacts. Location was also found to be a major factor in the level of impacts. Based on its relative size, SJRPP would generate a large overall level of beneficial economic impacts while also generating a large level of adverse impacts (land consumption, air quality degradation, etc.). Alternative 1, which includes small scale technologies, solar water heating systems, and refuse-fired power plants, results in significant environmental benefits in many resource areas since these components are more environmentally benign; that is, they encourage conservation and recycling. Similarly, Alternative 2 which includes large purchases of power from Georgia Power Company results in reduced adverse environmental impacts in the northeast Florida area since the resource consumption and pollutant generation of Plant Vogtle are not considered in the analysis. The impacts of Plant Vogtle are assumed to occur regardless of whether JEA and FP&L purchase a portion of this plant since the plant is certified and under construction.

Location is a major factor in determining the relative potential for impacts of a power plant. Many of the adverse impacts of the proposed project which cannot be completely mitigated are a function of its location. The impact on wetlands and the exacerbation of existing water quality problems may not have occurred at other alternative sites. Based on the site selection study, however, the lack of availability of other sites and/or political opposition to their selection appeared to present delays that could not be economically tolerated in Jacksonville. Therefore, a more readily available but more environmentally sensitive site was selected by JEA. Because of this, JEA has expressed a willingness to exert additional effort toward mitigation of project impacts.

6. Mitigation Measures for the Proposed Project

Several measures which would be employed to mitigate the potential impacts of the proposed project on the surrounding environment were identified during the environmental review process. Construction-related impacts on air resources will be mitigated by employing suitable fugitive dust and burning emission controls. Impacts of construction on water resources and aquatic life will be mitigated by implementation of a comprehensive erosion and sedimentation control plan and effective treatment of wastewater discharges. Construction related impacts on wetlands will be mitigated by establishment of a 200-foot buffer and a fence line around remaining wetlands on the site. (A 65-acre stand of hardwood swamp will also be preserved.) The feasibility of a gopher tortoise relocation program will be considered to mitigate impacts on this protected species which inhabits the main site. Construction impacts along the ROW will be minimized by adherence to Federal Power Commission guidelines. Dredging effects on biota in Mill Cove and Blount Island Channel will be reduced by limiting dredging activities to midwinter when biological activity is reduced. Mitigation of impacts on cultural resources on the site is being formulated in consultation with the SHPO and National Advisory Council.

Operation-related impacts will be controlled to the best extent practicable by use of state-of-the-art wastewater facilities. Air emissions will be controlled with electrostatic precipitators, boiler design, and FGD systems. Fugitive coal dust will be controlled with water spray dust suppression systems, enclosed conveyors, and fabric filters. Cooling tower drift will be controlled to a level of 0.002% of total recirculating water volume although controls are available to limit drift to 0.0005%. A site erosion and sedimentation control plan will help to minimize degradation of surface water quality in the vicinity of SJRPP. Solid waste landfills will be designed to reduce but not prevent trace elements and other materials from leaching into adjacent aquifers and surface waters.

7. Unresolved Issues

JEA has submitted a request for variance from water quality standards to FDER for the discharge of plant wastewater and cooling tower blowdown into Blount Island Channel. An additional variance request has also been submitted to FDER for dredging activities associated with construction of the Blount Island coal unloading facility. Both variance requests are currently being reviewed. In addition, the applicant has not demonstrated the ability to meet total residual chlorine level of 0.01 mg/l in the effluent from the construction runoff sedimentation pond and 0.2 mg/l of free available chlorine for no more than two hours per unit per day in the blowdown from SJRPP and NGS. For solid waste areas, a liner of suitable permeability (on the order of 1×10^{-7} cm/second) is recommended to effectively reduce seepage from the solid waste cells. JEA and FP&L propose a five-year study program to determine the best means of handling and disposal of high volume solid waste and a market for the sale of gypsum must be developed. In addition, the generation and ultimate disposal of potentially hazardous low volume waste has not been determined. Potential effects of construction on archaeological resources must be mitigated through pursuing an official Memorandum of Understanding with the SHPO and the National Advisory Council. Finally, a specific alignment of the transmission line within the existing corridor must be selected which minimizes potential impacts on land use, terrestrial wildlife habitats, and sensitive wetland areas.

8. USEPA's Environmentally Preferred Alternative and Recommended Action

It is anticipated that JEA and FP&L will resolve the outstanding environmental issues associated with the SJRPP. Based on preliminary findings, USEPA tentatively proposes to issue the NPDES Permit with conditions (See Appendix B - Draft NPDES Permit). It must be noted, however, that based on the initial findings of this SAR/EIS, various alternatives to the proposed project are available which appear to be at least comparable to the SJRPP from an economic and an environmental standpoint. Since these alternatives meet the oil backout goals of the proposed project, it can be argued that one of these alternatives could be implemented. The selection of one of the alternatives would defer a decision on the SJRPP for approximately three to four years when possibly the need could be better predicted and mitigation of impacts might be greater through improved technology.

Nevertheless, SJRPP has been shown to be an economically advantageous project for Jacksonville, its citizens, and FP&L and its customers. Not only does it displace oil, but it also provides additional generating capacity for the utilities which would have to be constructed at a later time as system demand rises and older units are phased out of use. Given the advantages offered by SJRPP and pending resolution of the outstanding issues, USEPA finds the proposed project, SJRPP, environmentally acceptable. Further, USEPA finds that the environmentally preferable components of SJRPP are:

- sulfur dioxide emission control consisting of a lime spray dryer or a lime/limestone FGD scrubbing system with by-product resource recovery;
- Particulate emission control consisting of electrostatic precipitators designed to achieve an emissions limit of 0.03 lb/MMBtu;
- natural draft cooling towers with a drift rate of 0.0005% and makeup from and blowdown to the Northside Generating Station discharge channel.
- Cooling system biological fouling control using chlorine with control to assure an average cooling tower blowdown concentration of no more than 0.2 mg/l for two hours per day, with an ultimate chlorine residual no more than 0.1 mg/l in the discharge;
- bottom ash and fly ash management consisting of dry handling and sale as a by-product;
- on-site disposal of unmarketable FGD sludge, bottom ash, and fly ash in landfill cells lined with a material with a permeability no less than 1×10^{-7} cm/sec; and
- coal delivery over land by rail rather than from the proposed Blount Island coal barge unloading facility.

These systems are preferred but not necessarily required. JEA and FP&L have demonstrated that other systems are environmentally compatible and can be approved.

It should be noted that there are alternatives to the proposed project with significatly different environmental impacts. However, the major alternative components, purchase of part of Plant Vogtle and conversion of oil-fired Sanford Units 4 and 5 to coal-firing, are not necessarily precluded by proceeding with SJRPP at this time. In fact, conversion of power plants from oil to coal is arguably facilitated by construction of additional capacity at SJRPP. JEA and FP&L have indicated that careful analysis of these options is underway and if found to be advantageous will be pursued.

9. FDER's Recommendations

If JEA and FP&L can resolve the potential ambient air quality violations, justify variances to water quality criteria, and agree to abide by the conditions of certification, the FDER would recommend certification of the SJRPP. This recommendation is based on the following rationale:

a. Full load operation of the SJRPP and the existing JEA power plants could violate the 24 hour SO_2 State standard. The violation could be avoided by shutting down Units 1 and 2 at the Southside Generating Station.

b. Installation of impermeable liners under solid waste disposal areas could avoid violation of groundwater quality standards and reduce an additional loading of heavy metals to the St. Johns Estuary.

c. Discharges from the wastewater treatment system can contribute contaminants to the St. Johns River which already contains excessive amounts of those contaminents. Proper operation of the wastewater treatment facility, use of mixing zones and approval of variances for some metals would allow certification to be granted.

d. Proper operation of the coal pile runoff sedimentation and neutralization systems at the Blount Island coal unloading facility can mitigate the impact of heavy metals leaching to the St. Johns River.

e. Dredging to construct the coal unloading facility docking area may temporarily contribute to water quality violations by resuspending heavy metals from the sediments. Approval of mixing zones and variances would allow construction to proceed.

f. Archaeological sites should be preserved or salvaged to avoid loss of historically important material.

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  J ST. JOHNS RIVER POWER PARK, SITE CERTIFICATION APPLICATION, ENVIRONMENTAL IMPACT DOCUMENT (INCORPORATED BY REFERENCE)
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  L SURFACE WATER RESOURCES
  M GROUNDWATER RESOURCES
  N EARTH RESOURCES/SOLID WASTE
  O BIOLOGICAL RESOURCES
  P CULTURAL RESOURCES
  Q SOCIOECONOMIC CONDITIONS
  R LAND USE, RECREATION, AND AESTHETICS
  S TRANSPORTATION
  T SOUND QUALITY
  U ENERGY
  V HUMAN HEALTH
  W SUMMARY OF SITE SELECTION PROCESS
  AA SELECTION OF ALTERNATIVES TO THE ST. JOHNS RIVER POWER PARK
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LIST OF ACRONYMS

BACT	Best Available Control Technology
bbl	Barrels
BOD	Biochemical Oxygen Demand
Btu	British thermal unit
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CO	Carbon Monoxide
COM	Coal-Oil Mixture
CWA	Clean Water Act
DVCA	Department of Veteran and Community Affairs
ECFRPC	East Central Florida Regional Planning Commission
EID	Environmental Information Document
EIS	Environmental Impact Statement
ESP	Electrostatic Precipitator
FAA	Federal Aviation Administration
FAAQS	Florida Ambient Air Quality Standards
FDAHRM	Florida Division of Archives, History and Records Management
FDER	Florida Department of Environmental Regulation
FECL	Florida East Coast Line
FEECA	Florida Energy Efficiency and Conservation Act
FGD	Flue Gas Desulfurization
FPC	Florida Power Corporation
FP&L	Florida Power & Light
FPSC	Florida Public Service Commission
g	Grams
GU	Government Use
gpm	Gallons per minute
HC	Hydrocarbons
HCl	Hydrochloric acid
IH	Heavy Industrial
IW	Industrial Waterfront

TSP	Total suspended particulates
UEC	United Engineers and Contractors
ug	Microgram
ug/m^3	Micrograms per cubic meter
USCOE	US Corps of Engineers
USEPA	US Environmental Protection Agency

1.0 INTRODUCTION

The Jacksonville Electric Authority (JEA) and Florida Power and Light Company (FP&L) propose to jointly construct and operate a New Source 1,200 megawatt (MW) coal-fired steam electric generating station known as the St. Johns River Power Park (SJRPP) on a 1,656-acre site in northern Duval County, Florida. JEA (as the lead applicant) and FP&L have applied to the US Environmental Protection Agency (USEPA), the Florida Department of Environmental Regulation (FDER), and other Federal agencies for the permits necessary to construct and operate the proposed facility.

This document constitutes both the FDER State Analysis Report and the USEPA Environmental Impact Statement (SAR/EIS) prepared jointly by USEPA and the FDER for the proposed project. This chapter provides an introduction to the project including: (1) a summary of USEPA's and FDER's responsibilities for the SAR/EIS; (2) a discussion of other Federal requirements relevant to the proposed project; (3) a summary of the coordination conducted between the USEPA and FDER during preparation of the SAR/EIS; (4) a description of the background and need for the proposed project; and (5) a summary of issues to be addressed in the SAR/EIS.

1.1 USEPA's AND FDER's RESPONSIBILITY FOR THE SAR/EIS

1.1.1 USEPA's Reponsibility for the EIS

Under Section 511(c) of the Clean Water Act, USEPA must comply with the National Environmental Policy Act (NEPA) prior to issuance of a New Source National Pollutant Discharge Elimination System (NPDES) permit. NEPA requires Federal agencies to prepare an Environmental Impact Statement (EIS) on every major Federal action significantly affecting the quality of the human environment. In this particular case, USEPA has determined that the new 1,200 MW coal-fired electric generating station proposed by JEA and FP&L has the potential for significant impact on the human environment and that an EIS must be prepared.

1.1.2 FDER's Responsibility for the SAR

Under provisions of the Florida Power Plant Siting Act (Chapter 403.501, Florida Statutes), FDER must prepare a State Analysis Report (SAR) upon which the State's decision to license any new power plant project will be made. The purpose of the power plant siting program is to provide an efficient, comprehensive, coordinated, one-stop permitting approach to the State evaluation of electric power plant location and operation. In accordance with the Act, no construction or expansion of a new electrical power plant may be initiated without certification by the State. Following submittal of FDER's SAR and recommendations regarding State certification, the final certification for all activities requiring State permits must be issued by the Governor and his Cabinet.

1.1.3 Memorandum of Understanding for Preparation of a Joint SAR/EIS Document

Until recently, USEPA and FDER had published separate reports to meet their responsibilities under NEPA and the Florida Power Plant Siting Act.

However, under the Memorandum of Understanding executed between USEPA and FDER on 1 October 1980, it was agreed that a single document would be produced to serve both as the SAR and EIS and that the two agencies would take steps to minimize duplication of effort and maximize coordination of effort in the licensing of new power plants in Florida. This joint document will meet the responsibilities of both agencies and will be known as the St. Johns River Power Park State Analysis Report/Environmental Impact Statement.

The objectives of the joint SAR/EIS are as follows:

- to describe the need for the new generating station as determined by the Florida Public Service Commission (FPSC);
- to develop and evaluate all reasonable alternatives to the project;
- to fully describe the selected project and its resulting impacts; and
- to investigate and describe measures that could be taken to eliminate or minimize identified adverse impacts.

1.2 OTHER FEDERAL REQUIREMENTS

Several other Federal requirements must also be met for the complete licensing of the proposed SJRPP. These include Prevention of Significant Deterioration (PSD) permitting under the Clean Air Act; a Section 10 dredging permit under the Rivers and Harbors Act; a Section 404 dredge and fill discharge permit under the Clean Water Act; compliance with the Endangered Species Act of 1973 (as amended); compliance with the National Historic Preservation Act and Executive Order No. 11593; compliance with Executive Order No. 11990 for protection of wetlands and Executive Order No. 11988 concerning development in flood prone areas; and Federal Aviation Administration (FAA) approval for emission stack heights under FAA regulations.

1.3 COORDINATION BETWEEN USEPA AND FDER

Extensive coordination between the USEPA and FDER occurred during the preparation of this SAR/EIS. This coordination consisted primarily of several preliminary planning sessions and formal meetings between USEPA, its consultants, and FDER. USEPA and FDER jointly sponsored the public scoping meeting in Jacksonville on 9 April 1981 in order to obtain input on key issues for determining the scope of the project. Both agencies will also conduct a joint public hearing on the SAR/EIS. Additional coordination was conducted via exchange of technical information concerning the proposed project. In general, FDER took the responsibility of evaluating the environmental impacts of the proposed project while USEPA was responsible for defining and evaluating the alternatives to the proposed project and preparing the SAR/EIS. Through mutual review of each output, FDER and USEPA satisfied the goals of the Memorandum of Understanding by complying with each agency's responsibilities for permitting while avoiding duplication of effort.

1.4 BACKGROUND OF THE PROJECT

This section provides an overview of the proposed St. Johns River Power Park. Included are an identification of the applicants and a history of the project.

1.4.1 Identification of the Applicants

The proposed project is a joint effort of the Jacksonville Electric Authority (JEA) and Florida Power and Light Company (FP&L) although JEA is the lead applicant for the necessary permits.

1.4.1.1 The Jacksonville Electric Authority (JEA)

The JEA is a municipally owned electric utility serving a portion of northeast Florida (Figure 1.4-1). The JEA service area includes Duval County and portions of St. Johns and Clay Counties, serving approximately 228,492 customers as of 31 December 1980 (JEA/FP&L 1981a). The utility currently operates three generating facilities consisting of 11 fossil steam units and 9 gas turbines (JEA/FP&L 1981a). Power is distributed over 447 miles of overhead and 43 miles of underground cable. The JEA is connected to other Florida utilities through two 230 kV and one 115 kV lines.

1.4.1.2 Florida Power and Light Company (FP&L)

FP&L is an investor owned utility serving the southern and eastern portions of peninsular Florida (Figure 1.4-2). The FP&L service area encompasses a total of 2,247,688 customers in 35 counties as of 31 December 1980 (JEA/FP&L 1981a). FP&L currently operates 12 generating plants distributed geographically around its service area. These generating facilities include 3 nuclear steam units, 26 fossil steam units, 48 gas turbines, 2 diesel installations, and 2 combined cycle units.

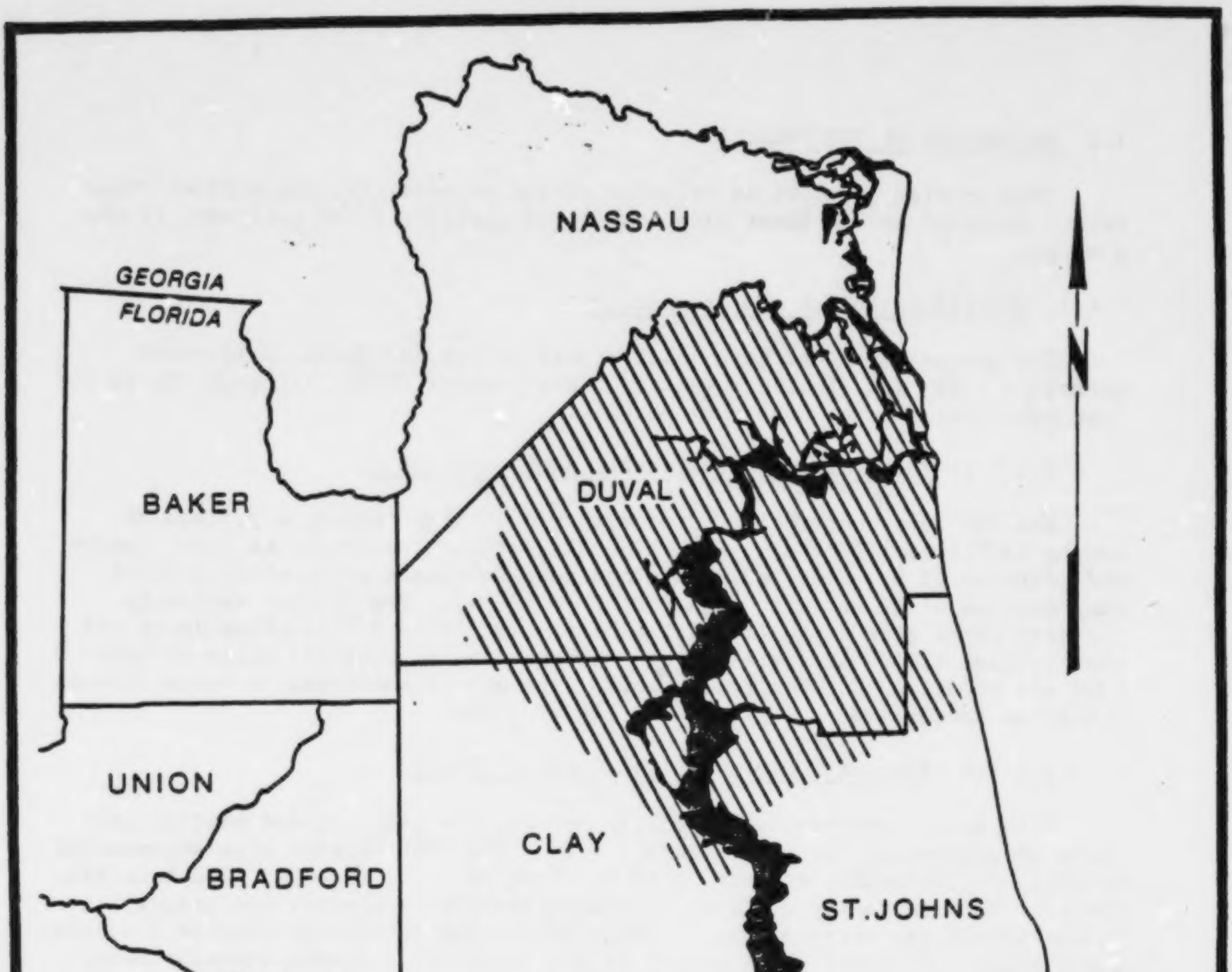
The FP&L bulk transmission system is composed of 316 miles of 500 kV and 1,950 miles of 240 kV lines. The underlying network is composed of 1,377 miles of 138 kV, 602 miles of 115 kV, and 311 miles of 69 kV transmission lines. FP&L is also interconnected to other Florida utilities through eight 240 kV, five 138 kV, and three 115 kV ties.

1.4.2 History of the Project

The proposed project was developed as a result of a series of extensive studies conducted by JEA since 1977 including long range generation project planning and site selection. This section summarizes the historical events which led to the decision by JEA to construct the SJRPP.

1.4.2.1 Project Planning

The proposed project originated initially as a result of JEA's energy demand forecasts published in 1977 which indicated a need for additional power generating capacity (JEA 1977). USEPA first became aware of the JEA's intention to construct a new power plant in 1976. Subsequent estimates prepared by JEA have shown a need for additional power in the late 1980's based on a projected decrease in the reliability of JEA's existing system (JEA/FP&L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DUVAL
UNION
CLAY
BRADFORD
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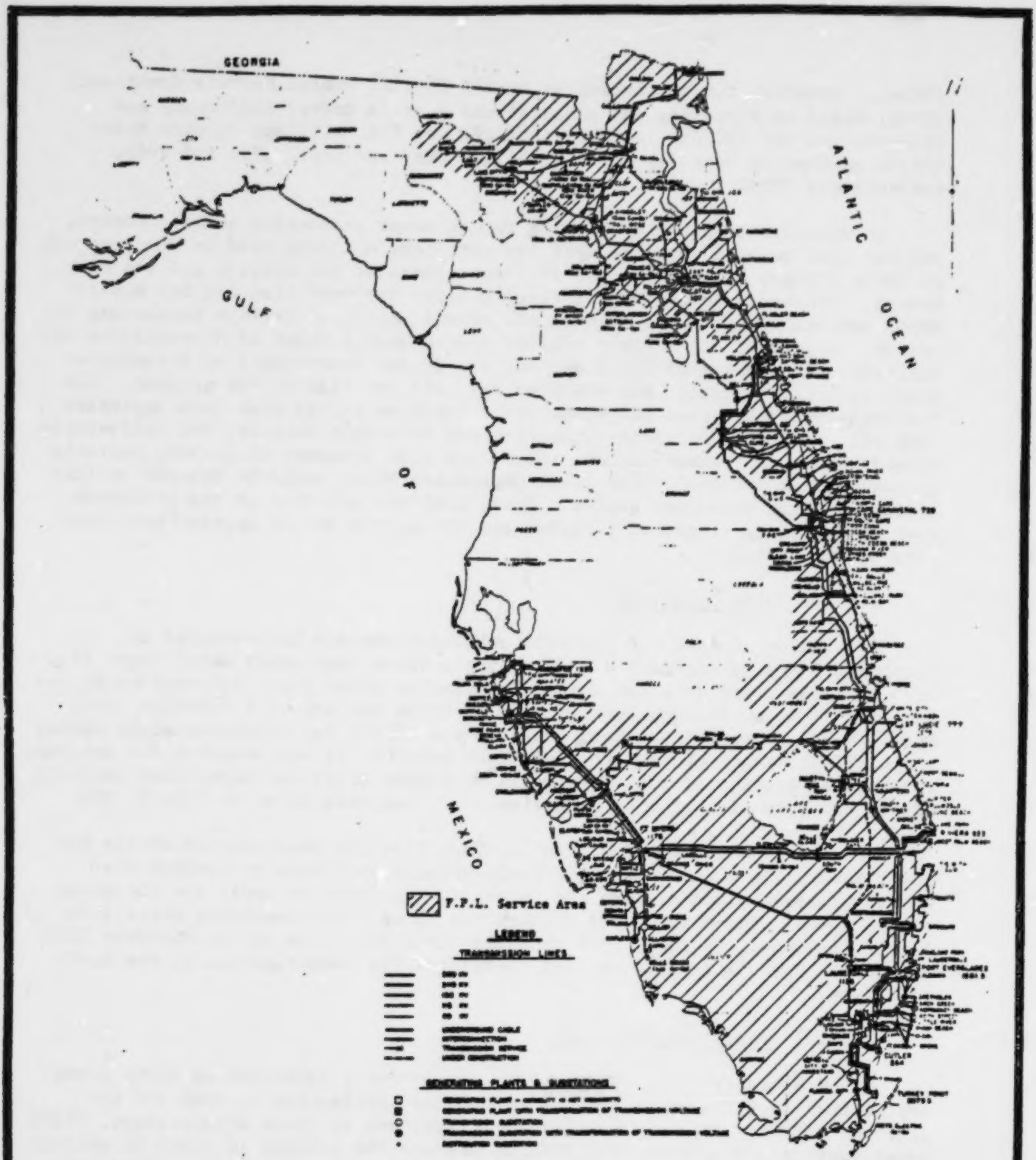
Figure 1.4-1. Jacksonville Electric Authority service area (JEA/FP&L 1981a).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F.P.L. Service Area
LEGEND
TRANSMISSION LINES
GENERATING PLANTS & SUBSTATIONS
NOTES
CUTLER
TURKEY POINT
SUBSTATION AND
TRANSMISSION SYSTEM
OF
FLORIDA POWER & LIGHT CO.

Figure 1.4-2. Florida Power & Light Company service area (JEA/FP&L 1981a).

1981a). However, current estimates by the Florida Public Service Commission (FPSC) based on achieving the goals of the Florida Energy Efficiency and Conservation Act (FEECA) indicate that JEA and FP&L will not require additional generating capacity for reliability purposes until 1991 and 1989, respectively (FPSC 1981).

In addition to planning for its future power generation needs, however, JEA has been seeking means to meet the near term economic need to displace oil as their primary boiler fuel and to reduce costs to the utility and its customers. JEA has been a 100% oil-fired utility for some time and has experienced extremely high rates through the recent period of rapidly escalating oil prices. A goal of JEA's early studies was to seek a means of diversifying its fuel mix. The choice of fuels was subject to the constraints of transportation, anticipated price, and availability over the life of the project. JEA has determined that coal met these constraints as it was much less expensive than oil, available in large quantities and from many sources, and deliverable by many modes of transportation. There are also a number of proven, reliable system designs for coal-fired power generation which could be brought on-line by the time the power was needed. Thus, coal was selected as the preferred fuel in the early stages of planning and the search for an appropriate plant site was initiated.

1.4.2.2 Site Selection

A detailed analysis of the site selection process is presented in Section 2.3 and in Appendix W. Following a three year study which began in 1977, the JEA Board selected a site for the new power plant referred to as the Eastport Site in northern Duval County at their meeting on 5 February 1980. Although this site had not been rated as one of the top preferred sites during the earliest stages of the site selection process, it was selected for economic reasons and because of the unavailability and/or political opposition faced by JEA in the selection of more environmentally suitable sites in Clay County.

Prior to the selection of the Eastport Site for construction of the new power plant, JEA authorized their engineering consultants to conduct the necessary studies and prepare the necessary documents to apply for licensing of the plant. The consultants studied the three final candidate sites from August 1979 until February 1980 when the final selection of the Eastport Site was made. From that point on, JEA restricted its investigation to the Eastport Site.

1.4.2.3 Permit Applications

On 18 February 1981, JEA and FP&L concurrently submitted an NPDES permit application to USEPA and a Site Certification Application to FDER for the proposed SJRPP at the Eastport Site. In response to these applications, USEPA began cooperative efforts with FDER to prepare the SAR/EIS in order to satisfy the legal responsibilities of both agencies for licensing of New Source power plants. A joint public scoping meeting was held in Jacksonville on 9 April 1981 to solicit public input to the scoping of the SAR/EIS and publication of the report was scheduled for October 1981.

1.5 NEED FOR THE PROJECT

In the case of a new power plant in Florida, the determination of need for the project is a matter for resolution by the Florida Public Service Commission (FPSC). According to Chapter 80-65 of the Florida Statutes, a formal Determination of Need must be made by the FPSC prior to certification of a proposed power plant subject to the Power Plant Siting Act. This determination serves as the report required of the FPSC as part of the State Power Plant Site Certification proceedings.

The FPSC received a joint petition from JEA and FP&L for the determination of need for their proposed 1,100 MW net coal-fired SJRPP Units 1 and 2 and associated transmission facilities on 4 February 1981. Briefly stated, JEA and FP&L applied to FPSC for two reasons: (1) the need for additional capacity to provide reliable electric service to their customers; and (2) the reduction of electric rates through the displacement of oil-fired generation by the SJRPP.

This two-fold consideration of the need for the proposed action is reflected in the approach of the FPSC in analyzing this case. In the FPSC's Order Number 10108 on Docket Number 810045-EU dated 26 June 1981 (Appendix E) which is the final determination of need for the proposed units, the FPSC states (FPSC 1981b):

> "We construe the 'need for power' issue to encompass several aspects of need. In our evaluation of the need for SJRPP Units 1 and 2 and related facilities, we have considered the principal areas of the electrical need for additional capacity to insure an adequate supply of bulk electrical power and energy to electric consumers and the economic need of providing this bulk power and energy at the lowest possible cost. In addition, the socio-economic need of reducing the consumption of imported oil in the State of Florida has been considered. Each of these aspects of need for SJRPP 1 and 2 was evaluated with respect to the electrical consumers of JEA, FPL, and peninsular Florida as a whole."

1.5.1 Need For Additional Generating Capacity

As noted in the FPSC's order, it is the responsibility of the utilities to provide reliable power at the lowest possible cost. Further, pursuant to FEECA, Section 366.82 F.S., enacted by the 1980 Legislature, the FPSC has established conservation goals for the electric utilities of Florida. Should these goals be achieved, the average annual compound rate of peninsular Florida energy consumption growth during the period of 1980 through 1989 would be reduced to 2.9% (FPSC 1981a). The rate of peninsular summer and winter firm peak load growth during this period would be limited to 2.7% and 2.8%, respectively. Also, by 1990 the consumption of oil as a boiler fuel in Florida would be reduced to a level 25% less than that estimated to be consumed in 1980 pursuant to the State of Florida, 1980 Ten Year Plan.

1.5.1.1 JEA

To determine the level of generating reserve margins adequate for its system, JEA employs the probabilistic technique of Loss of Load Hours (LOLH). LOLH quantifies a design index which takes into consideration the uncertainties under which a generation expansion plan must be made. JEA has determined an LOLH index of 120 hours per year exclusive of any assistance from tie lines to be adequate for its system. This index approximates reserves in the amount of the largest unit on the JEA system, the 499 net MW Northside Unit 3.

The proposed SJRPP Units 1 and 2 are tentatively scheduled to be placed in service in December 1985 and June 1987, respectively. JEA and FP&L will jointly own each of the two 550 net MW coal-fired generating units. Assuming that the FEECA goals will be met, the FPSC determined that the JEA would not require additional generating capacity for reliability purposes until 1991 (FPSC 1981b).

1.5.1.2 FP&L

To determine the level of generating reserves adequate for its system, FP&L employs the probabilistic technique of Loss of Load Probability (LOLP) and consideration of percent reserve margins (FPSC 1981a). Based on its analyses, FP&L believes that reserve margins in the order of 20 to 25% are adequate for their system. Assuming that the FEECA Goals for FP&L are achieved, the reserve margins for the FP&L system without the proposed SJRPP Units 1 and 2 and other noncertified generating units were determined by the FPSC to be adequate until 1989 (FPSC 1981b).

1.5.1.3 Peninsular Florida

In terms of electricity generation, Florida is divided into two distinct areas: peninsular Florida east of the Appalachicola River; and the Gulf power system serving portions of the Panhandle. The FPSC reviews the power generation needs of peninsular Florida as a whole due to the degree of interconnection among the utilities serving the area. A Loss of Load Probability (LOLP) is used to estimate the adequacy of reserve margins for peninsular Florida. The FPSC has determined that peninsular generating reserves on the order of 25% are adequate for planning purposes. Reserve margins below 20% are of concern since maintenance, forced outages, and load forecast errors can easily deplete this margin. The anticipated reserve margin for peninsular Florida, assuming the FEECA KW conservation goals are achieved and excluding the proposed SJRPP Units 1 and 2, were estimated by the FPSC to be adequate for planning purposes until 1991. Hence, should the FEECA KW conservation goals be achieved, it appears that the SJRPP Units 1 and 2 in the time frame proposed are not needed from a peninsular reliability standpoint (FPSC 1981b).

1.5.2 Economic Displacement of Oil-Fired Power

1.5.2.1 JEA

At present, all of JEA's generating capacity is comprised of oil-fired units. The only non-oil-fired capacity presently available is JEA's purchase of coal-fired power from Georgia Power Company. The cost of its heavy reliance on oil-fired power is reflected in JEA's rates, some of the highest in the country. In the absence of a need for additional capacity, the JEA could use its share of the power from SJRPP Units 1 and 2 to displace expensive oil-fired power at a substantial savings. Given the estimated relationship between the costs of coal and oil over the life of the project, the FPSC estimated that JEA could save $95,985,000 in 1986 and $804,027,000 in 2000 (FPSC 1981b).

1.5.2.2. FP&L

At present, FP&L is a more diversified utility than is JEA, but nonetheless still relies on oil-fired generation for 56.4% of its net energy production. Although FP&L has a need for additional generating capacity sooner than does JEA, substantial economic savings may still be realized by displacing oil-fired power on the system as soon as possible. Using the same assumptions as applied to JEA, the FPSC estimated that FP&L could save $29,604,000 in 1986 and $654,262,000 in 2000 (FPSC 1981b).

1.5.2.3 Peninsular Florida

According to estimates by the FPSC, a total of approximately $10 billion could be saved in peninsular Florida as a whole by displacing the amount of oil which could be displaced by the proposed project (FPSC 1981b).

1.5.3 Conclusion

A need for oil displacement has been clearly established within the two utility systems and peninsular Florida. The finding of the FPSC with respect to the need for power from SJRPP Units 1 and 2 was that JEA and FP&L would require the additional capacity in 1991 and 1989, respectively, rather than at the time proposed by the utilities (1985 for Unit 1 and 1987 for Unit 2). Also, it was determined that the additional capacity would not be needed from a peninsular reliability standpoint until 1991 (FPSC 1981b). However, the FPSC did conclude that the SJRPP could be justified if it were shown to be an economical method of displacing oil-fired generating capacity and issued the following statement (FPSC 1981b):

> "Should the the Commission's FEECA goals governing the growth of seasonal kilowatt demand be achieved, additional generating capacity for the purpose of insuring adequate supplies of power and energy to peninsular Florida electric consumers does not appear to be required until 1991. Similarly, JEA and FP&L do not appear to require additional generating capacity for reliability purposes until 1991 and 1989 respectively, should they achieve their respective FEECA seasonal kilowatt demand goals. Thus, the salient issue in the determination of the need for SJRPP Units 1 and 2 with in-service dates of December 1985 and May 1987, respectively, is whether the construction of these units in the time frames proposed represents the lowest cost alternative available to the continued use of expensive oil-fired generation in peninsular Florida, and in the areas served by JEA and FPL."

During the proceedings on the determination of need for the SJRPP, the FPSC examined a variety of alternative means of displacing oil-fired generating capacity including the proposed project (SJRPP); additional purchase of non oil-fired power from outside of Florida; conversion of existing oil-fired units to burn coal, coal-water mixtures, or coal-oil mixtures (COM); purchase of a portion of Georgia Power's Plant Vogtle nuclear units; and additional conservation. The FPSC certified the need for the project based on the following determination (FPSC 1981b):

> "Having considered the record in this matter, we find that a need exists for the construction of St. Johns River Power Park Units 1 and 2 in the time frame proposed by the applicants, in that construction of the units appears to be the best available alternative to the continued use of expensive oil-fired generation, based upon the most reasonable projections of future fuel cost and our appraisal of possible alternatives."

Having found that a need exists to displace oil-fired power generation in the proposed time frame of the SJRPP Units 1 and 2, the FPSC also found that the proposed SJRPP appeared to be the best available alternative.

USEPA is required to examine all reasonable alternatives to a proposed action in an EIS. Based on this requirement, USEPA proceeded with its evaluation of alternatives utilizing relevant information from the FPSC and issues identified during the EIS scoping process.

1.6 ISSUES TO BE ADDRESSED IN THE SAR/EIS

Several key issues concerning the proposed project were identified through internal agency review by USEPA and FDER and as a result of the public scoping meeting held in Jacksonville on 9 April 1981. The following is a summary of these issues:

- The environmental impacts of alternative electrical energy sources available to JEA and FP&L which could help reduce consumer costs as well as the utilities' dependence on foreign oil;
- The significance of current air pollution conditions in the Jacksonville area and the effect of the proposed project and the available alternatives on public health and the nearby Class I Okefenokee Swamp;
- The alternatives for algal suppression within the cooling system of the proposed project; potential interaction of the proposed plant with existing Northside Units and resulting chlorine residuals;
- Compliance of the proposed project with water quality standards especially with respect to estuarine species' tolerance to specific parameters projected by the JEA to exceed those standards;

- Potential impacts of the proposed project due to malfunctioning of the flue gas desulfurization system and electrostatic precipitators, results of complete or partial malfunction of these pollution control devices, and resulting emission excursions on the air quality of the Jacksonville area;
- Contribution of power plant emissions to sulfate formation and low pH rainfall; potential impacts of the proposed project combined with existing plants and those under construction on sulfate formation and low pH rainfall;
- Potential impacts of groundwater withdrawal during construction and operation phases; specifically, the effects on groundwater resources from plant construction and the operation of the FGD (flue gas desulfurization) system.
- Potential effects of salt drift from natural draft cooling towers on surrounding vegetation and farms;
- Potential effects of dredging and filling associated with installation of transmission lines and coal unloading facilities;
- Potential effects of leachates from coal piles on Blount Island on aquatic life in the St. Johns River;
- Potential effects on groundwater quality due to leachate from fly ash and FGD sludge ponds on the site;
- Potential impacts of construction activities and landfill operations on sensitive wetlands located on the site area and in the surrounding area; and
- Potential socioeconomic impacts of the project including local economy, secondary growth, housing availability, community services, and land-use patterns.

Analysis of these issues will be the central focus of the SAR/EIS.

2.0 ALTERNATIVES INCLUDING THE PROPOSED PROJECT

2.1 REGULATORY ALTERNATIVES

In order for JEA and FP&L to construct and operate a new electric generating station, the companies must comply with a number of local, State, and Federal laws, regulations, and ordinances. The agencies primarily involved in permitting activities are the US Environmental Protection Agency (USEPA) and the Florida Department of Environmental Regulation (FDER). The other major permitting agency is the US Army Corps of Engineers (USCOE). The permitting alternatives available to these agencies are outlined in the following sections.

2.1.1 Alternatives Available to USEPA

The alternatives available to USEPA in accordance with its regulatory and permitting authority pursuant to Section 402 of the Clean Water Act are to issue or to deny the New Source National Pollutant Discharge Elimination System (NPDES) Permit requested by JEA and FP&L for the SJRPP discharge into the St. Johns River. USEPA also must decide whether to issue or deny a Prevention of Significant Deterioration (PSD) Permit in accordance with Part C of the Clean Air Act (CAA). Conditional requirements or modifications to the PSD Permit based on anticipated project impacts may be added to the Permit, if warranted.

2.1.1.1 Issuance of the NPDES Permit

Issuance of the New Source NPDES Permit will allow the SJRPP to operate as proposed and to discharge cooling water blowdown and treated wastewater into the St. Johns River up to the limits set forth in the permit (Appendix B, Draft NPDES Permit). The issuance of the permit may be modified by certain conditions which could require that additional monitoring and reporting be undertaken during the operation of the plant in order to evaluate the effectiveness of the pollution control systems. Such conditions will be added to the permit if the environmental impacts of the construction and/or operation of the plant require special mitigation practices and additional monitoring and reporting.

2.1.1.2 Denial of the NPDES Permit

If it is determined that the proposed SJRPP discharge into the St. Johns River will violate effluent limitations and/or water quality standards, USEPA may deny the New Source NPDES Permit. Furthermore, USEPA could deny the permit if environmental resources such as endangered species, historic and/or archaeological sites, wetlands, or floodplains are significantly impacted and measures for mitigating the impacts are unacceptable. The denial of the permit would be equivalent to the No Action Alternative and would result in not discharging the wastewater effluent into the St. Johns River. If the permit is denied by USEPA, JEA and FP&L would have the options of redesigning the project, including the pollution control facilities, to meet the water quality standards and resubmitting the application, locating and evaluating another site, or pursuing the No Action Alternative.

2.1.1.3 PSD Permit

The CAA Amendments of 1977 require that a PSD permit be secured for SJRPP from USEPA before construction begins. New Source Performance Standards (NSPS) and Best Available Control Technologies (BACT) must be met for the emission of air pollutants. USEPA has given tentative approval to the PSD permit application for the SJRPP, but has not issued the permit and maintains the right to deny the permit based on final review. The final determination will not be made until after the USEPA public hearing. Should the USEPA deny the permit, the utilities would be given the opportunity to reduce facility emissions or make efforts to reduce emissions from other facilities to reduce projected impacts and meet the goals of the CAA Amendments which relate to PSD. Further, the PSD permit cannot be issued if the National Ambient Air Quality Standards (NAAQS) are predicted to be exceeded within the impact area of the project. If the NAAQS for any criteria pollutant are exceeded or if a significant increase in the level of a pollutant in a non-attainment area should occur as a result of the operation of the facility, the utilities would be given the opportunity to mitigate those impacts.

2.1.2 Alternatives Available to FDER

The FDER administers a State wastewater discharge permit program under the Florida Air and Water Pollution Control Act and also provides State certification of all Federally issued permits in Florida. In the case of new power generation facilities, review and permitting under these and other environmental programs within Florida have been coordinated into a one-stop process pursuant to the Florida Electrical Power Plant Siting Act (Chapter 403, Part II, F.A.C.). Under the Power Plant Siting Act, FDER conducts a coordinated review for each proposed New Source power plant project which incorporates all State agency reviews. A final written report known as the State Analysis Report (SAR) is prepared which includes FDER's recommendation regarding final State certification of the project. This analytical report includes: (1) reports from the Division of State Planning, the Public Service Commission, and other State agencies; (2) results of studies of the project conducted by FDER; (3) a statement of compliance with FDER rules; and (4) a recommendation for final action.

The final State certification of a power plant is issued by the Governor and his Cabinet. This certification represents final State approval for all State and Federally permitted activities of the project and may mandate specific requirements pursuant to compliance with various State standards and regulations. Under the certification process, the alternatives available to FDER pursuant to the Power Plant Siting Act are to recommend certification of the project as proposed, certification of the project with revisions, or denial of certification. The ramifications of certification or denial of certification would be similar to those described for issuance or denial of the NPDES permit described in Section 2.1.1.

2.1.3 Alternatives Available to Other Permitting Agencies

Other permits required for project construction and initial operation include the Section 10 Permit required under the River and Harbor Act of 1899 for dredging activities associated with the Blount Island coal terminal and a Clean Water Act Section 404 Permit for the disposal of dredge material from the barge slip construction. The USCOE is responsible for administering these permit programs and will base their approval or denial of the permits on the environmental impacts associated with these actions. FDER has certification authority under Section 401 of the CWA for permits issued by Federal agencies for disposal of dredge material under Section 404. The State's certification options for this action are covered under the comprehensive Power Plant Siting Act described in Section 2.1.2.

2.2 THE APPLICANT'S PROPOSED PROJECT

JEA and FP&L propose to jointly construct and operate a new 1,200 megawatt (MW) (1,100 MW net) coal-fired steam electric generating station on a site approximately seven miles north-northeast of downtown Jacksonville in Duval County, Florida. The site and the proposed power project including its associated transmission and coal barge unloading facilities are described in this section. The reader is referred to the utilities' Site Certification Application/Environmental Information Document (JEA/FP&L 1981a) for more detailed information.

2.2.1 The Project Site

It is proposed that a new 1,200 MW class power plant to be known as the St. Johns River Power Park (SJRPP) be constructed on a site referred to as the Eastport site adjacent to JEA's existing Northside Generating Station (NGS) in northern Duval County (Figure 2.2-1). This site is primarily owned by the North Shore Corporation and includes approximately 1,656 acres (JEA/FP&L 1981a). The NGS occupies approximately 410 acres between the Eastport site and the St. Johns River. The boundaries of the SJRPP include New Berlin Road on the west, the Jacksonville City Landfill on the north, and marshland on the east and south.

Included in the proposed project is a coal barge unloading facility which is to occupy approximately 55 acres of land on Blount Island adjacent to the St. Johns River. The coal barge unloading facility on Blount Island is bounded by the Fulton-Dame Point Cutoff to the south, a salt marsh and the Offshore Power Systems Corporation to the east, Undine Steet to the north, and the Jacksonville Port Authority to the west.

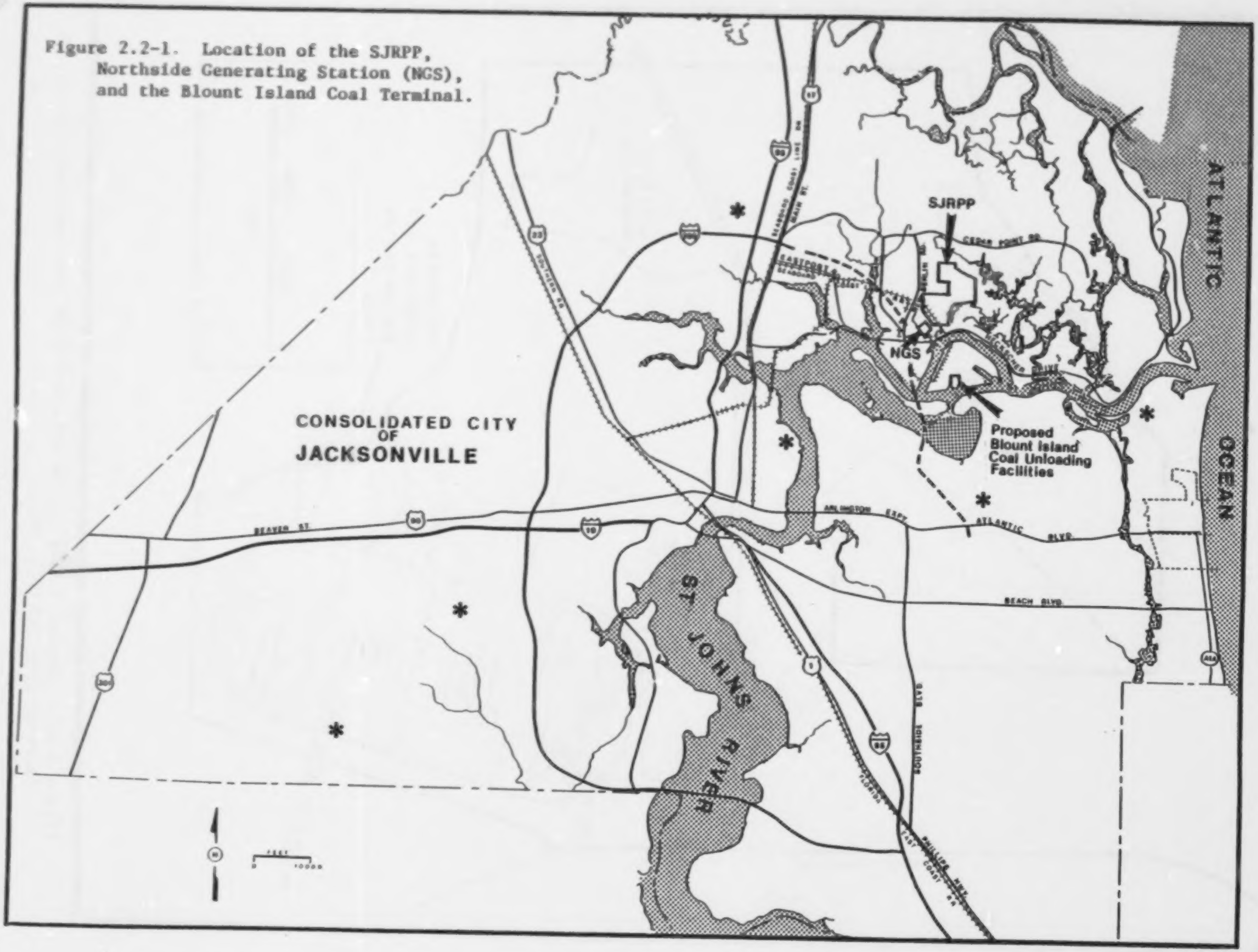
Approximately 1,307 acres of the Eastport site are comprised of trees, shrubs, and grasses. Wetlands comprise approximately 289 acres and a sand drag racing track with grandstands occupies approximately 60 acres within the site boundaries at the intersection of New Berlin Road and Island Drive. The site is crossed by transmission lines from the NGS as well as by the Seaboard Coast Line Railroad which serves Blount Island. The Blount Island site has been severely disturbed over the past 10 to 15 years due to industrial activity, and as a result, its land cover is mostly grasses, scrub growth, and open land.

2.2.2 Plant Orientation and Appearance

2.2.2.1 Facilities Orientation

The proposed plant will consist of two 600 MW coal-fired units within a ±300 acre oval rail loop and is basically aligned along an axis running from northwest to southeast (Figure 2.2-2). The surrounding land will be used as a

Figure 2.2-1. Location of the SJRPP, Northside Generating Station (NGS), and the Blount Island Coal Terminal.



ATLANTIC
OCEAN
SJRPP
NGS
Proposed Blount Island Coal Unloading Facilities
CEDAR POINT RD
CONSOLIDATED CITY OF JACKSONVILLE
ST JOHNS RIVER
BEAVER ST
ARLINGTON EXPY
ATLANTIC BLVD
BEACH BLVD
SOUTHSIDE BLVD
MAIN ST
SOUTHERN RR
EAST COAST RR
PHILLIPS HWY
95
10
1
17
23
295
90
301
A1A
FEET
0
10000

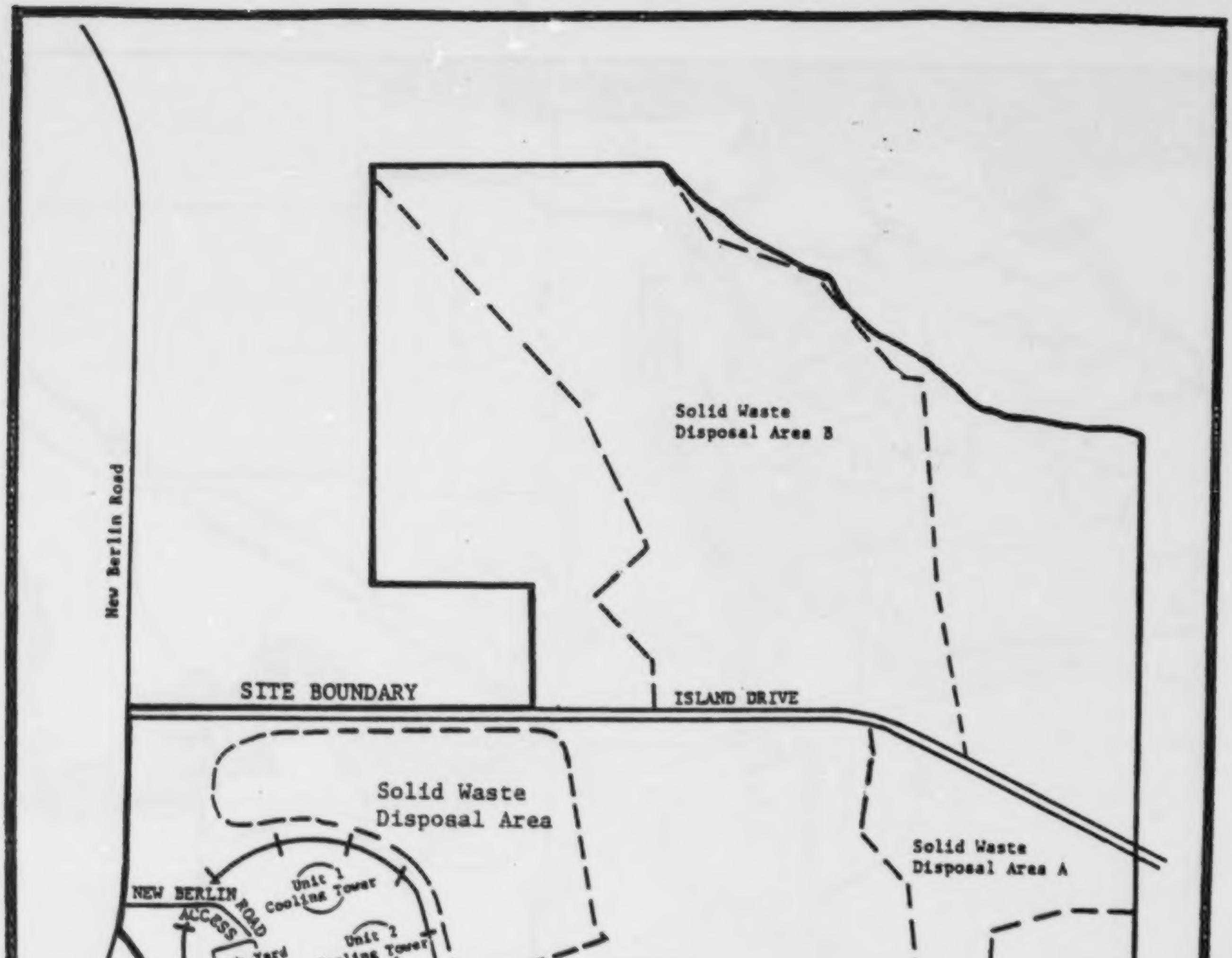

New Berlin Road
Solid Waste Disposal Area B
SITE BOUNDARY
ISLAND DRIVE
Solid Waste Disposal Area
Solid Waste Disposal Area A
NEW BERLIN ROAD ACCESS
Unit 1 Cooling Tower
Unit 2 Cooling Tower
Switch Yard
Turbine Bldg.
Precipitators/SO2 Removal
RAIL LOOP
Wastewater Treatment and Sedimentation Ponds
Chimney
TO NORTHSIDE ACCESS ROAD
Coal Storage/ Reclaimer
0
1000
2000
3000
Feet

Figure 2.2-2. General layout of the proposed SJRPP and associated facilities (adapted from JEA/FP&L 1981a).

buffer area and for solid waste disposal. The stack (utilized by both units) will be just south of the center of the oval (Figure 2.2-3). Cooling towers will be located at the north end of the plant rail loop. Coal handling facilities to accommodate delivery of coal by rail and for coal storage will be located to the south of the plant rail loop. Scrubber wastes and ash disposal areas will be located in the north and northeast sections of the site. Major facilities within the plant rail loop include the turbine generator, boiler, precipitators, and flue gas desulfurization facilities. As indicated in Figure 2.2-4, none of the plant facilities will be constructed on or below the mean high water (MHW) line.

Major coal handling facilities on Blount Island include an unloading wharf suitable for oceangoing barges, a stacker reclaimer and coal storage pile, a railcar loading area, emergency coal stackout, and a runoff holding basin and percolation pond with a capacity of 2.75 million gallons (Figure 2.2-5). The coal unloader and wharf will be the only structures located on or outside of the MHW line (Figure 2.2-6).

2.2.2.2 External Appearance

A wooded buffer strip between 100 and 200 feet deep will be maintained between the plant and adjoining roadways. The cooling towers (425 feet high) and the chimney (640 feet high) will be the tallest structures in the facility. These will be equipped with flashing stroboscopic lights for aircraft warning and will dominate the surrounding landscape. The other facilities including the boiler buildings, turbine buildings, coal pile, conveyors, and pollution controls will be less noticeable (JEA/FP&L 1981a).

2.2.3 Power Generation System

Two 600 MW steam electric generating units will be constructed on the site. A generalized process diagram for a typical coal-fired electric generating facility is shown in Figure 2.2-7. In general, pulverized coal is burned in a boiler to generate high pressure steam. This steam is then used to power a turbine which drives a generator and produces electricity. Following use in the turbine, steam from the boiler is cooled to a liquid in the condenser and recirculated back to the boiler feedwater system for reuse. Simultaneously, the cooling water for the condenser is recirculated to the cooling tower to dissipate excess heat. In addition to the main boilers, the plant will also be equipped with two small auxiliary oil-fired steam generating boilers which will be used during start-up and low load operation periods.

2.2.4 Fuel Transportation and Handling

The SJRPP will burn approximately 3.5 million tons per year of coal, probably from Tennessee, Kentucky, or Ohio (EBASCO 1980 in JEA/FP&L 1981a). The coal can be delivered to the site either by unit trains or to the Blount Island coal terminal by oceangoing barges with shuttle train delivery to the plant. In the former case, it is estimated that an average of one and a maximum of three unit trains with each train consisting of 72 rail cars with 106 tons/car would arrive at the site on any given day. Coal will be unloaded by a rotary rail car dumper and transported by the stacker/reclaimer either to an 8 acre active coal pile or one of two 15 acre inactive coal piles at the plant.

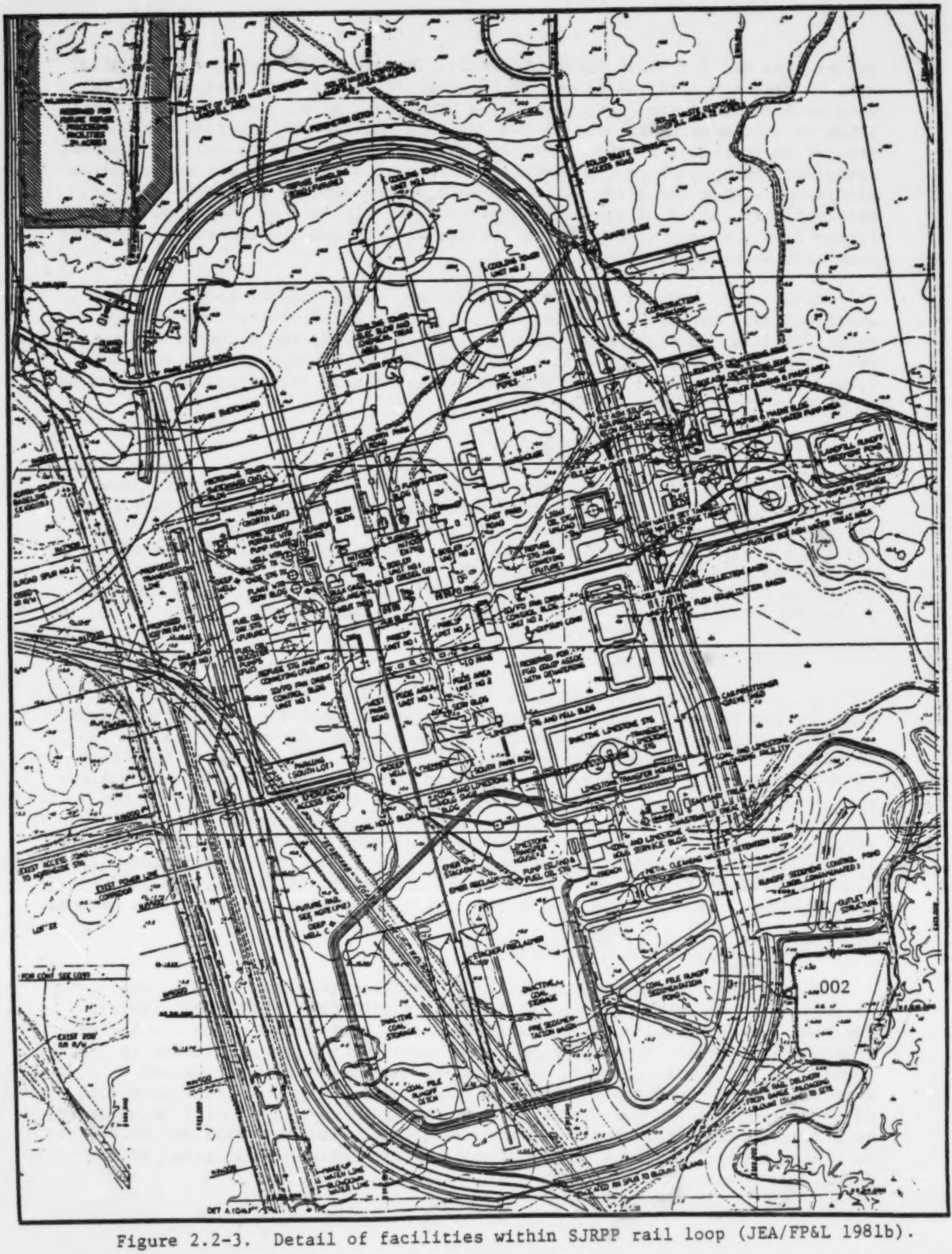

COOLING TOWER UNIT NO 1
COOLING TOWER UNIT NO 2
PARKING (NORTH LOT)
PARKING (SOUTH LOT)
FUEL OIL DAY STG (FUTURE)
REFUSE STG AND CONVEYING (FUTURE)
SO2/FD FAN DRIVE CONTROL BLDG UNIT NO 1
SO2/FD FAN DRIVE CONTROL BLDG UNIT NO 2
PRECIP UNIT NO 1
PRECIP UNIT NO 2
FGD AREA UNIT NO 1
FGD AREA UNIT NO 2
RESERVED FOR FGD EQUIP ASSOC WITH DEWATERING
LIMESTONE STG AND FILL BLDG
INACTIVE LIMESTONE STG
LIMESTONE TRANSFER HOUSE
SOUTH PARK ROAD
COAL HDLG BLDG
COAL AND LIMESTONE HDLG SERVICE BLDG
LIMESTONE TRANSFER HOUSE 2
PUMP ISLAND & FUEL OIL STG
METAL CLEANING WASTES RETENTION BASIN
CAR POSITIONER GRADE SHED
COAL AND LIMESTONE UNLOADING FACILITY
EMERGENCY ACCESS ROAD
STACKER/RECLAIMER
INACTIVE COAL STORAGE
COAL PILE RUNOFF SEDIMENTATION POND
COAL PILE RUNOFF DITCH
EXIST POWER LINE CORRIDOR
EXIST ACCESS ROAD TO NORTHSIDE STA
RUNOFF SEDIMENT CONTROL POND
OUTLET STRUCTURE
002

Figure 2.2-3. Detail of facilities within SJRPP rail loop (JEA/FP&L 1981b).

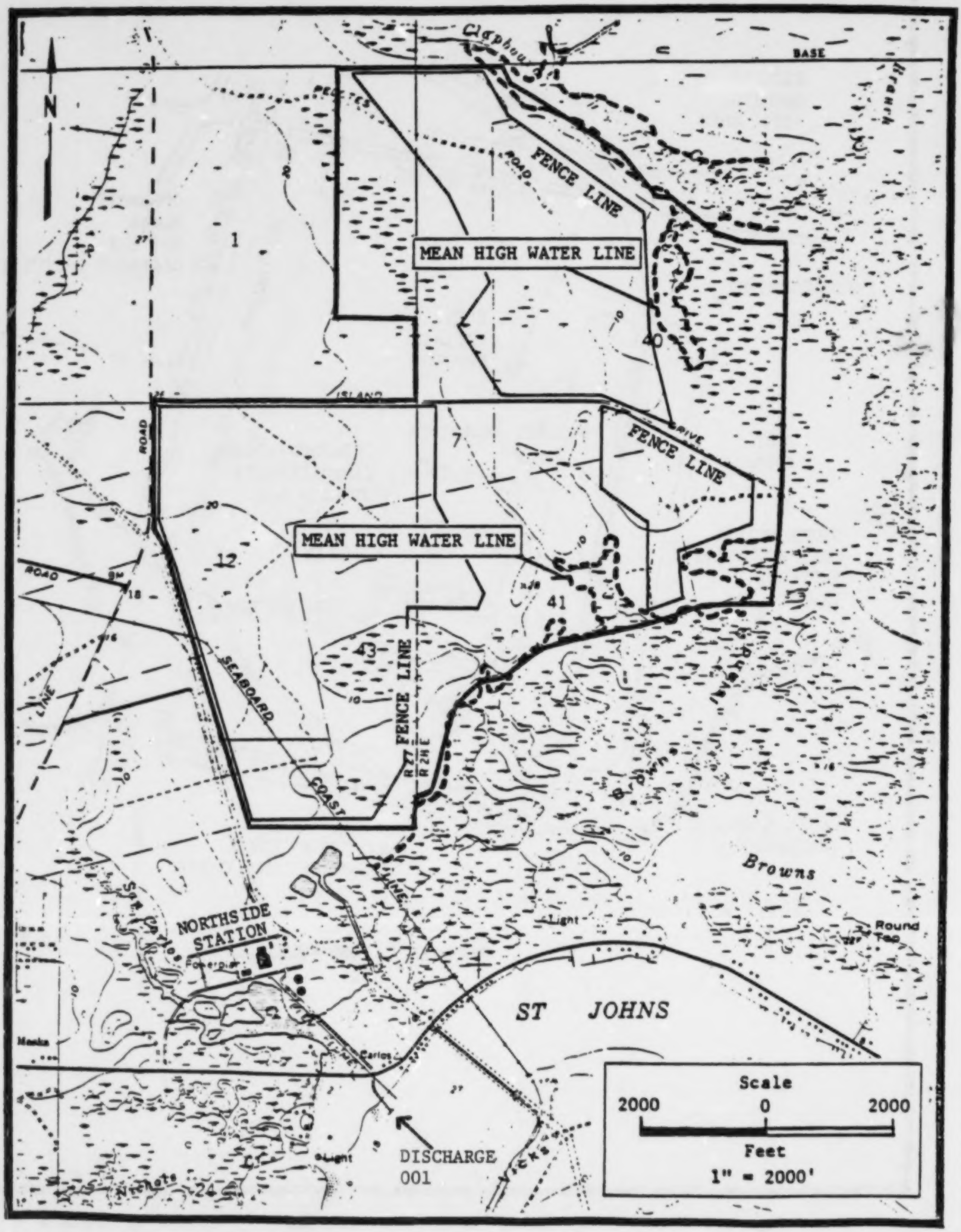

N
Clapboard
BASE
Branch
Creek
FENCE LINE
MEAN HIGH WATER LINE
1
40
ISLAND
DRIVE
7
FENCE LINE
MEAN HIGH WATER LINE
12
41
43
ROAD
ROAD
LINE
SEABOARD
COAST
LINE
FENCE LINE
R27E
R28E
Browns
Light
Round Top
NORTHSIDE STATION
ST JOHNS
Scale
2000
0
2000
Feet
1" = 2000'
DISCHARGE 001
Nichols
24

Figure 2.2-4. Approximate mean high water line adjacent to the proposed SJRPP site (JEA/FP&L 1981a).

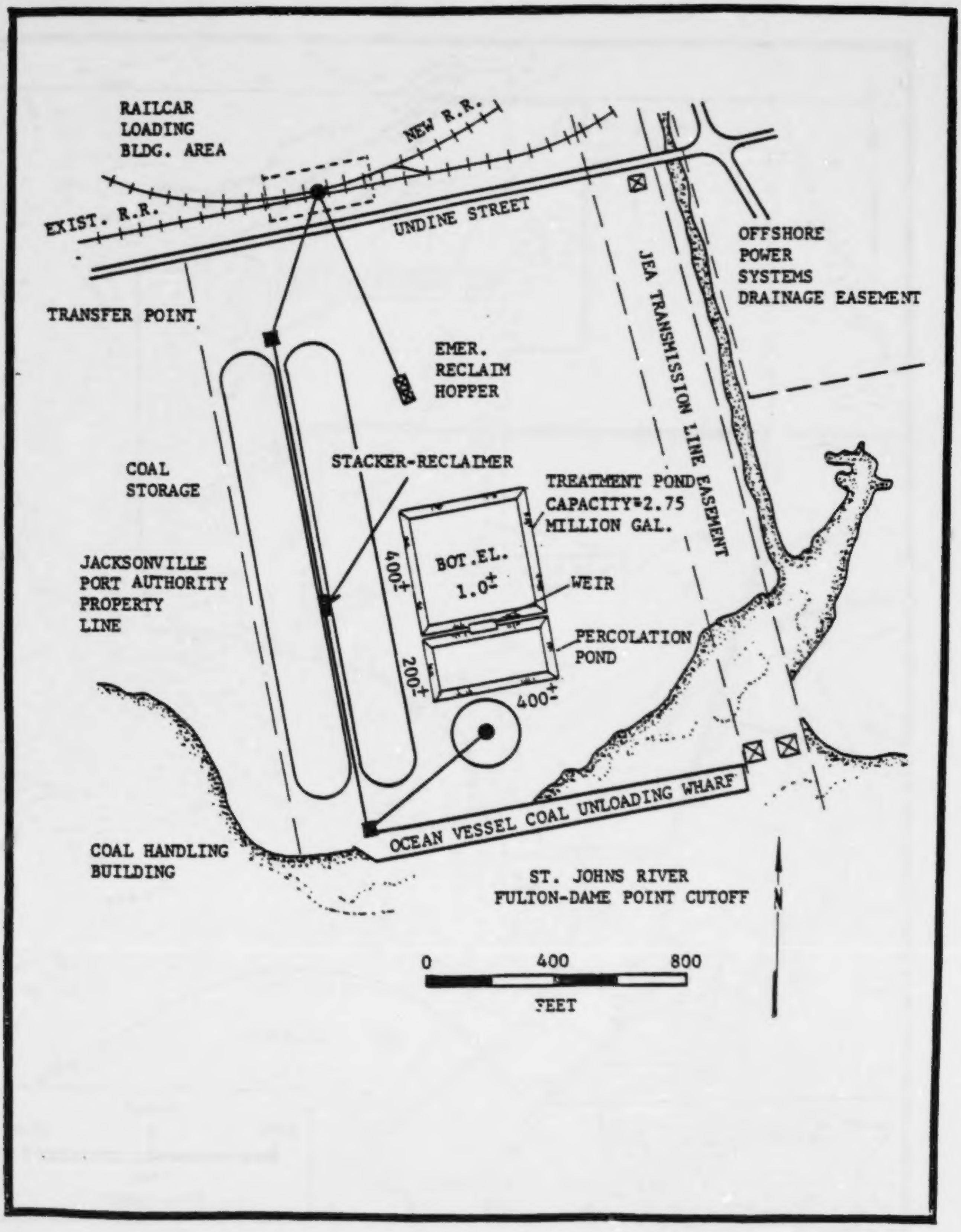

RAILCAR
LOADING
BLDG. AREA
NEW R.R.
EXIST. R.R.
UNDINE STREET
OFFSHORE
POWER
SYSTEMS
DRAINAGE EASEMENT
TRANSFER POINT
EMER.
RECLAIM
HOPPER
JEA TRANSMISSION LINE EASEMENT
COAL
STORAGE
STACKER-RECLAIMER
TREATMENT POND
CAPACITY=2.75
MILLION GAL.
BOT.EL.
1.0±
400±
WEIR
JACKSONVILLE
PORT AUTHORITY
PROPERTY
LINE
PERCOLATION
POND
200±
400±
OCEAN VESSEL COAL UNLOADING WHARF
COAL HANDLING
BUILDING
ST. JOHNS RIVER
FULTON-DAME POINT CUTOFF
N
0
400
800
FEET

Figure 2.2-5. Blount Island coal unloading facility (JEA/FP&L 1981a).

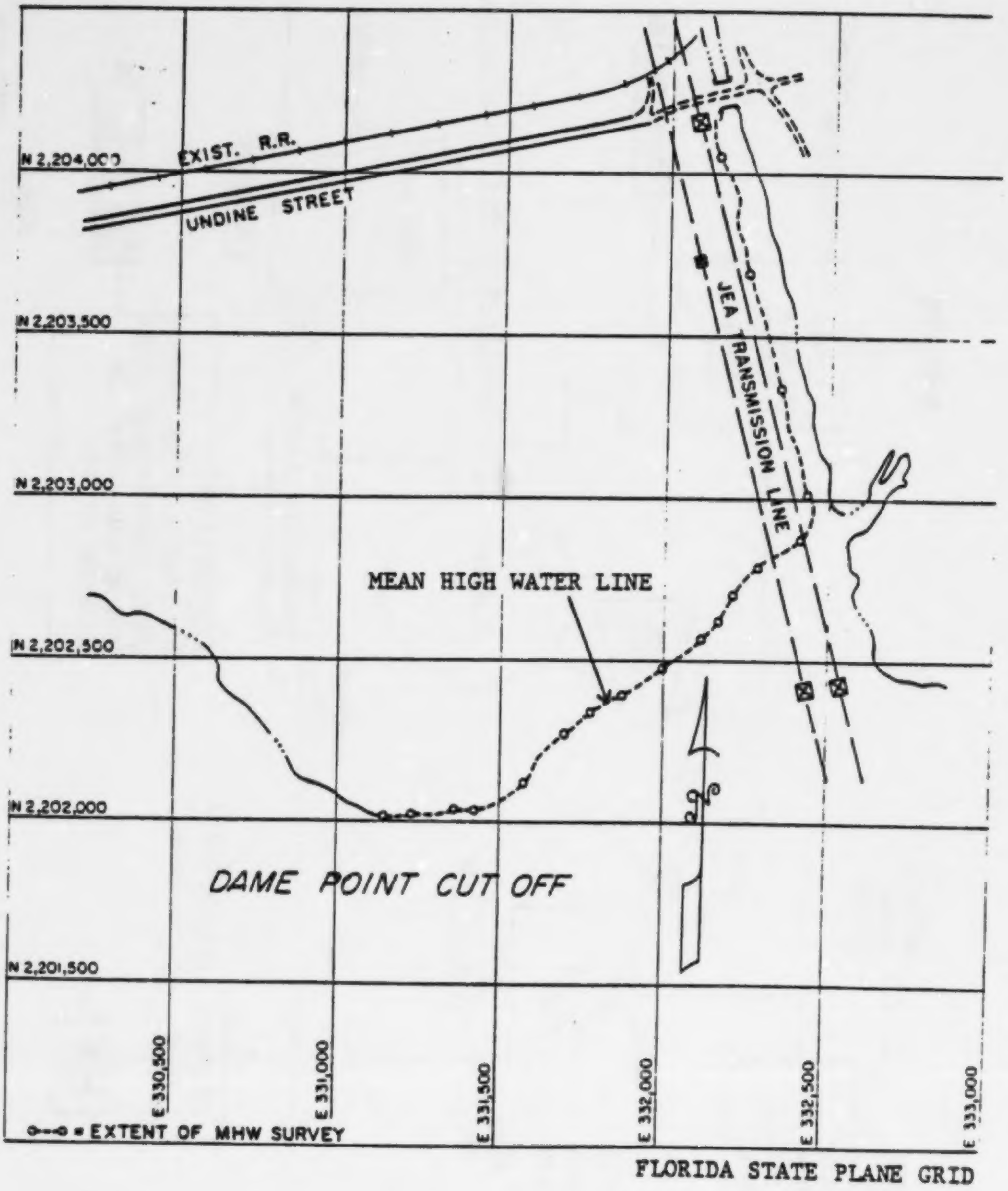

EXIST. R.R.
UNDINE STREET
JEA TRANSMISSION LINE
N 2,204,000
N 2,203,500
N 2,203,000
N 2,202,500
N 2,202,000
N 2,201,500
MEAN HIGH WATER LINE
DAME POINT CUT OFF
E 330,500
E 331,000
E 331,500
E 332,000
E 332,500
E 333,000
o--o = EXTENT OF MHW SURVEY
FLORIDA STATE PLANE GRID

Figure 2.2-6. Surveyed mean high water (MHW) line at proposed coal unloading facility on Blount Island (JEA/FP&L 1981a).

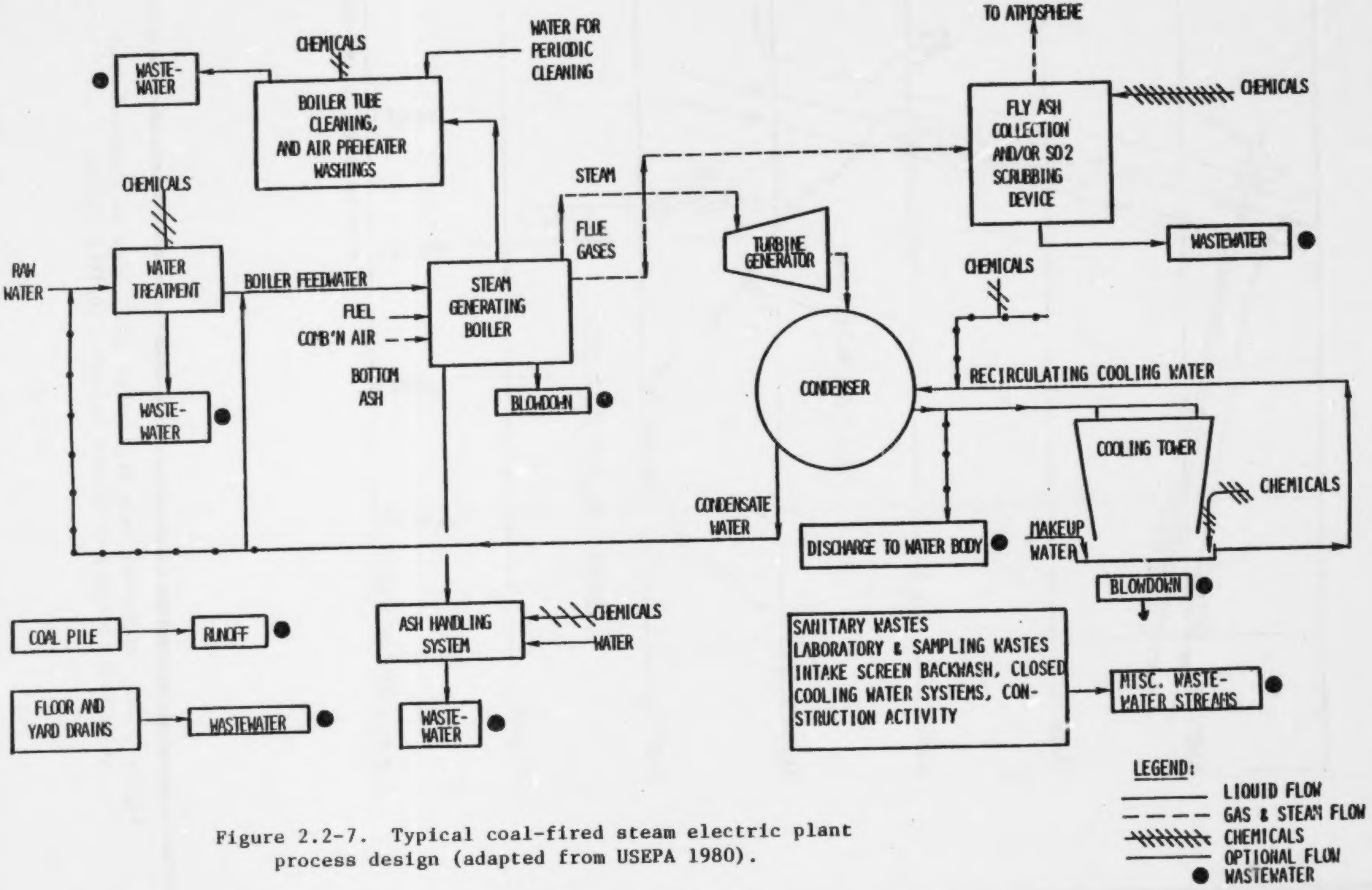

TO ATMOSPHERE
CHEMICALS
WASTE-WATER
BOILER TUBE CLEANING, AND AIR PREHEATER WASHINGS
WATER FOR PERIODIC CLEANING
CHEMICALS
FLY ASH COLLECTION AND/OR SO2 SCRUBBING DEVICE
CHEMICALS
STEAM
FLUE GASES
RAW WATER
WATER TREATMENT
BOILER FEEDWATER
STEAM GENERATING BOILER
FUEL
COMB'N AIR
BOTTOM ASH
TURBINE GENERATOR
WASTEWATER
CHEMICALS
CONDENSER
RECIRCULATING COOLING WATER
WASTE-WATER
BLOWDOWN
COOLING TOWER
CHEMICALS
CONDENSATE WATER
DISCHARGE TO WATER BODY
MAKEUP WATER
BLOWDOWN
COAL PILE
RUNOFF
ASH HANDLING SYSTEM
CHEMICALS
WATER
SANITARY WASTES
LABORATORY & SAMPLING WASTES
INTAKE SCREEN BACKWASH, CLOSED COOLING WATER SYSTEMS, CONSTRUCTION ACTIVITY
MISC. WASTE-WATER STREAMS
FLOOR AND YARD DRAINS
WASTEWATER
WASTE-WATER
LEGEND:
LIQUID FLOW
GAS & STEAM FLOW
CHEMICALS
OPTIONAL FLOW
WASTEWATER

Figure 2.2-7. Typical coal-fired steam electric plant process design (adapted from USEPA 1980).

Currently JEA and FP&L plan to line the coal storage areas with an impervious plastic liner to prevent groundwater contamination from coal leachate. From the coal storage areas the coal will be conveyed to a tripper floor transfer point, and from there to the seven coal storage silos serving each of the units. Coal from the silos will be conveyed to the pulverizer and pneumatically delivered to the furnaces.

The Blount Island coal unloading facility will be capable of unloading the 65,000 tons of coal from a typical oceangoing barge in about 22 hours using two bucket-type unloaders. The coal will be transported by the stacker/reclaimer to a lined 70,000 ton coal storage area. From the storage area, coal will be transferred to rail shuttle cars at the railcar loading building. The facility will have an emergency stackout system as a backup for the stacker/reclaimer and a coal handling control building with sampling and iron separating equipment (JEA/FP&L 1981a).

The auxiliary boilers will require approximately one million gallons of No. 2 fuel oil per year. It will be delivered to the site by barge, rail, or truck and stored on-site in a 600,000 gallon storage tank.

2.2.5 Emission Control Systems

JEA and FP&L propose to incorporate air pollution control facilities into the plant to control emissions of sulfur dioxide, nitrogen oxides, particulates (fly ash), carbon monoxide, hydrocarbons, and fugitive dust. Other trace pollutants will also be removed from plant emissions along with these major criteria pollutants. All of these systems are designed to meet the New Source Performance Standards (NSPS) and the Best Available Control Technology (BACT) requirements of USEPA's PSD regulations.

2.2.5.1 Electrostatic Precipitators (ESP)

Emissions of particulates from the boilers will be controlled to the 99.78% level by the use of electrostatic precipitators (ESP) (JEA/FP&L 1981a). Two ESP's will be provided for each generating unit to assure reliability of operation. Particulate removal is effected by passing the flue gas through a high voltage field in which the particulates are given an electric charge from ionized gases and are collected on an oppositely charged electrode. Particulates are periodically removed from the collection electrode and collected in a hopper to await removal pneumatically and ultimate disposal. It is estimated that fly ash will be collected at a maximum rate of about 81 tons/hour.

2.2.5.2 Flue Gas Desulfurization (FGD)

Emissions of sulfur dioxide (SO_2) will be controlled to the 90% level by the use of a limestone flue gas scrubbing system which will follow the ESP system (JEA/FP&L 1981a). In this process, the SO_2 in the flue gas comes into contact and chemically reacts with a recirculating limestone slurry in the scrubber to form a precipitate or sludge of calcium sulfite and calcium sulfate (gypsum). The waste sludge will undergo forced oxidation in a reaction tank to convert all calcium sulfite to gypsum, and will then be removed for disposal or sale. The SJRPP flue gas desulfurization (FGD) system is designed to use groundwater rather than saline water from the St. Johns River to minimize the concentration of chlorides in the gypsum. It is anticipated that this high-grade gypsum can be sold to a local wallboard manufacturer. A maximum of 134 tons/hour of gypsum is estimated to be produced by the system on a dry weight basis. Temporary 7-day storage of by-product gypsum will be provided in a stackout area outside of the rail loop. If the material cannot be sold, it will be mixed with other high volume waste materials and disposed of in the on-site landfill areas. Makeup water will be added to the process at an average of 2,150 gpm (maximum 3,150 gpm) to compensate for evaporative losses, water lost in the waste sludge, and the 1,000 gpm scrubber blowdown. A small portion of the flue gas will be bypassed around the scrubbers to reheat the cleaned gases as they emerge in order to improve the plume rise characteristics of the gas and to prevent condensation in the stack.

2.2.5.3 Other Boiler Emissions Controls (ESP)

Emissions of nitrogen oxides (NOx) will be controlled by the design and control of boiler operations to levels required by NSPS (JEA/FP&L 1981a). Carbon monoxide emissions will also be controlled by boiler design and operation. Since carbon monoxide generation varies inversely with NOx generation, however, boiler design and operation must be optimized to minimize the generation of each of these pollutants. No specific provisions have been made to control generation of hydrocarbons. They are expected to be relatively low, however.

2.2.5.4 Fugitive Dust

Fugitive dust will be produced by a number of sources including the coal handling, limestone handling, fly ash handling, and the FGD waste handling and disposal systems. Fugitive particulates will also be generated from the dissolved and suspended solids in the mist from the cooling towers. Controls for these sources of particulates are planned as follows:

- Coal Handling. Fugitive dust will be controlled by different methods at each point in the coal handling system. Wetting agents (90-99% efficient) will be used on the various coal piles; fabric filters (99.9% efficient) will be used to clean emissions from the unloader of the coal barge terminal at conveyor transfer points and at the surge bins of the coal handling building. Water spray systems (97% efficient) will be used on the stacker reclaimer and rotary dump areas. Conveying systems will be totally enclosed.

- Limestone Handling. Dust from unloading railcars of limestone will be suppressed with water sprays. The limestone will be transported on enclosed conveyors and hoppers will be vented to fabric filters. Storage piles of limestone rock are not expected to require fugitive dust controls.

- Fly Ash and FGD Sludge Handling. Fly ash will be transported in enclosed conveyors with fabric filters at all transfer points. Fly ash will either be sold as a by-product or mixed with wet scrubber sludge and stored in the landfill.

- Cooling Tower Drift. Fugitive particulates in the cooling tower drift will be controlled to a level of 8.4 grams/second by the use of drift eliminators, barriers within the cooling towers, and by limiting the cycles of concentration in the cooling system to 1.5 or less.

2.2.5.5 Auxiliary Boiler Emission Controls

No controls are planned for the auxiliary boilers because they will be used only infrequently (approximately 5% of the time) and will burn relatively clean No. 2 fuel oil.

2.2.6 Cooling System

Each of the power generation condenser units will be cooled by a recirculating natural draft counterflow cooling tower. Each tower will have a base diameter of 340 feet and will be approximately 425 feet high. Makeup water will be drawn from the NGS discharge channel and blowdown water will be discharged along with all plant wastewater (NPDES 001) into the NGS discharge channel downstream from the makeup water intake.

2.2.6.1 Circulating Water System

Cooling water will be continuously recirculated from the boiler water condensers to the cooling towers. Each of the cooling towers will continuously recirculate 183,500 gallons per minute (gpm) of condenser cooling water, 10,900 gpm of component cooling water, and 800 gpm of vacuum pump cooling water (JEA/FP&L 1981a). Makeup water will be added at a rate of 17,200 gpm for a total flow of 212,400 gpm in each cooling tower. Chlorine will be added to the cooling tower water system to prevent biological fouling, and sulfuric acid will be added to prevent calcium carbonate scale formation. A non-chemical system (Amertap) may be used to control biological fouling in the condensers.

2.2.6.2 Cooling System Intake and Blowdown Discharge

On an average annual basis, between 9,679 and 10,920 gpm of cooling water will be evaporated from the cooling system (Table 2.2-1). A minimum of water (approximately 10 gpm) will also be lost as cooling tower drift. When in operation, makeup water will be withdrawn from the NGS discharge for the two cooling towers at a constant rate of 34,400 gpm and blowdown will vary from 24,821 to 23,580 gpm depending on the outside temperature. This will result in approximately 1.5 cycles of concentration in the cooling system. The total makeup requirements of the SJRPP amount to approximately 0.4% of the average flow of the St. Johns River, but as long as the NGS remains in operation this does not represent an increase in the total withdrawal from the River since the makeup water is withdrawn from the discharge of the NGS once-through cooling system.

2.2.7 Wastewater Treatment Systems

Wastewater for the SJRPP will originate from a number of sources such as cooling tower blowdown, boiler water, bottom ash handling blowdown, metal cleaning waste, FGD blowdown, sanitary wastes, site runoff, and various low

Table 2.2-1. Average monthly evaporation, blowdown, and blowdown concentrations for both SJRPP units (JEA/FP&L 1981a).

Month	Dew Point (°F)	Dry Bulb (°F)	Evap[a] (gpm)	Blowdown (gpm)	Blowdown[b] Concentrations
J	47.0	65.0	10,294	24,205	1.43
F	43.0	56.0	9,679	24,821	1.39
M	52.0	67.0	10,336	24,164	1.43
A	56.0	72.0	10,610	23,890	1.44
M	63.0	75.0	10,652	23,848	1.45
J	69.0	80.0	10,840	23,660	1.46
J	71.0	82.0	10,920	23,580	1.46
A	72.5	82.0	10,876	23,624	1.46
S	71.5	81.0	10,836	23,664	1.46
O	64.0	74.0	10,552	23,948	1.44
N	50.0	67.0	10,381	24,119	1.43
D	48.5	66.0	10,254	24,246	1.42

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[a] Estimated

[b] Calculated based on estimated evaporation rate

volume sources such as demineralizer blowdown and floor drains. Plant effluents will be reused, treated and reused, or treated and discharged when reuse is not feasible. The proposed water and wastewater treatment scheme for the SJRPP is schematically represented in Figure 2.2-8.

The plant wastewater treatment system will consist of pretreatment facilities, a central chemical waste treatment facility, and a sanitary waste treatment facility. The pretreatment facilities include sedimentation ponds for various wastewater flows, a retention basin for metal cleaning wastes, a flow equalization basin, miscellaneous oil-water separators, and an oily wastewater collection basin. For some runoff wastewaters, oil separation is the only treatment necessary.

2.2.7.1 Pretreatment Facilities

Sedimentation Ponds

Pretreatment facilities including flow equalization, oil and grease removal, waste stream segregation, and sedimentation will be integral parts of the SJRPP wastewater treatment scheme. Several sedimentation ponds will be constructed during the life of the project. Area runoff from approximately 67 acres of the site including the oil storage, coal storage, limestone storage, and solid waste storage and handling areas will be routed to sedimentation ponds adequate to contain runoff from the at least 10-year, 24-hour storm (JEA/FP&L 1981b). Runoff from a storm event in excess of this design may be discharged to Browns Creek via an emergency overflow lines (NDPES 004 and 009). The sedimentation ponds serving the main coal storage area and the Blount Island coal terminal will be lined. The discharge from the coal pile runoff sedimentation pond serving SJRPP will be used for coal dust suppression or routed to the central wastewater treatment facility for treatment. Effluent from the Blount Island sedimentation pond will be used for coal dust suppression or treated and discharged to a percolation pond. Small, unlined sedimentation ponds will be constructed close to the landfill areas in active use at the time. Discharges from these ponds will be routed to the central waste treatment facility or, in the event of a rainfall in excess of the 10-year, 24-hour storm, to Browns Creek (NPDES 009). Water from the sedimentation ponds will be used for coal dust suppression. Any runoff from dust suppression will be collected and returned to the sedimentation ponds.

Oily Wastewater Pond

Oily wastewaters and oil contaminated runoff will be treated in oil/water separators and transported to an oily wastewater collection pond. The effluent from the oily wastewater pond will be discharged directly to the NGS discharge channel (NPDES 008) or used as makeup to the bottom ash sluicing system or discharged to the central wastewater treatment facility.

Metal Cleaning Waste Retention Basin

Metal cleaning wastewater will be stored in a lined, two cell retention basin with a capacity of 1.5 to 2.0 million gallons prior to treatment in the central wastewater treatment facility. These wastes result from scheduled periodic maintenance cleaning of the air preheaters, boiler fireside, and boiler waterside. Air or steam operated sootblowers will be utilized for the

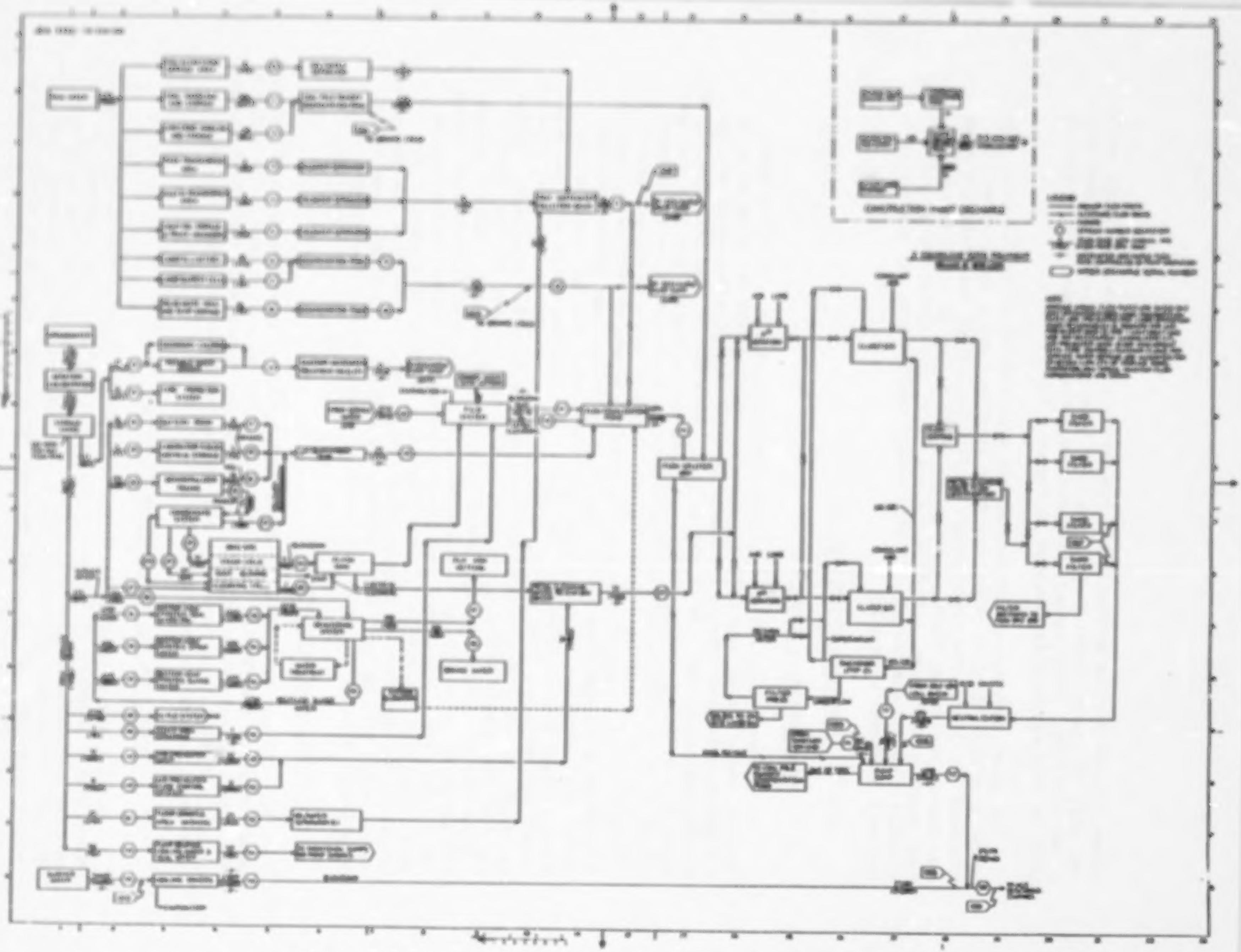

Figure 2.2-8. Water and wastewater balance for SJRPP at full load (JEA/FP&L 1981b).

fireside boiler cleaning. Air preheaters are periodically washed to remove accumulated deposits of ash. Waterside cleaning of boilers is designed to remove scale and corrosion products that accumulate inside the boiler tubes and other water passages. Chemicals are used for boiler cleaning due to the inaccessibility of these waterside surfaces for mechanical cleaning. The air preheater and the boiler waterside cleaning wastes will require treatment for iron removal, pH adjustment, and suspended solids removal. These metal cleaning wastes will be directed to the retention basin for equalization and storage prior to treatment at the central treatment facility. Metal cleaning wastewater will be segregated from all other plant wastes during the entire treatment process (NDPES 008), but will be discharged with other wastes.

Flow Equalization

A lined, two cell flow equalization basin of approximately 4 million gallons capacity will be provided to contain intermittent flows from the FGD system, demineralizer regeneration system, and other low volume wastewaters. The FGD system will require blowdown of approximately 1,000 gpm to remove chlorides and dissolved solids from the system. Basically, the blowdown will contain the same constituents as those present in the makeup water plus trace contaminants picked up from coal combustion emissions. Demineralizer regeneration waste is characterized by high concentrations of dissolved solids and extremes of pH. These wastes will be neutralized in the equalization basin and treated in the central chemical wastewater treatment facility. The equalization basin will also have sufficient capacity to contain runoff from the solid waste handling and storage area and effluent from the oily wastewater collection basin if they require additional treatment prior to discharge. Boiler blowdown is relatively uncontaminated and will be used as makeup water for the FGD system.

2.2.7.2 Central Chemical Wastewater Treatment Facility (NPDES 006 and 007)

The dual train chemical wastewater treatment facility is designed to treat contaminated runoff and plant wastes continuously at an average rate of 125 gpm and a maximum rate of 3,600 gpm. Treatment will consist of various combinations of pH adjustment, aeration, flocculation, gravity separation, media filtration, and final neutralization depending on the particular waste being treated. The purpose of the initial pH adjustment is to raise the combined wastewater stream pH to the optimum level for removal of iron, copper, and other metals. The aeration process will promote oxidation of metallic ions which will allow them to precipitate out of solution, and the reactor-clarifier will then provide flocculation and sedimentation of metallic hydroxides. Filtration will provide further removal of suspended solids, and the neutralization process will adjust the process stream pH to a range of between 6 and 9. Except for metal cleaning wastes, all wastewaters will be routed through a flow splitter box to either of the two treatment trains. Metal cleaning wastes will be accumulated in the retention basin and routed to either of the two trains through separate influent lines for completely separate treatment (NPDES 007). This separate treatment of metal cleaning wastes will be maintained throughout the treatment system until the point of final neutralization. Wastewater effluent which cannot be reused will be routed to the NGS discharge channel (NPDES 001).

2.2.7.3 Sanitary Wastewater Treatment Facility (NPDES 003)

Two 15,000 gpd extended aeration type wastewater treatment plants will be constructed on-site to provide treatment for sanitary wastes (JEA/FP&L 1981b). Both units and additional portable toilets will be used during the construction phase when as many as 2,300 workers will be on-site. However, only one of the units will be required to treat the waste from the normal operational staff of 375. The other unit will be retained as a spare. During construction, effluent from the sanitary wastewater treatment facility will be discharged to the construction runoff control ponds and thence to Browns Creek (NPDES 002). Once operation begins, the effluent will be discharged to the NGS discharge channel (NPDES 001) along with other plant effluents.

2.2.7.4 Construction Wastewater Treatment

Treatment for area runoff, concrete truck washing, sanitary waste, and pre-operation metal cleaning waste generated during construction will be provided (JEA/FP&L 1981b). Area runoff from within the rail loop will be directed to several temporary sediment control ponds from which effluent will be collected in the main sediment control pond and discharged to Browns Creek (NPDES 002). Wastewater from concrete truck washing will be directed to a 2.2 million gallon sedimentation pond and from there to the runoff control pond. Runoff from the heavy equipment refueling area will be treated in an oil/water separator before going to the runoff control pond. Pre-operation boiler and condensate systems cleaning wastes probably will be treated on-site by neutralization in the metal cleaning waste retention basin, final treatment in the chemical waste treatment facility (NDPES 007), and discharge to the NGS discharge channel. Another alternative available to the utilities is to have the pre-operational metal cleaning waste treated and disposed of by a contractor.

2.2.7.5 Summary of Wastewater Treatment Facilities

Individual process wastewater streams contributing to the SJRPP normal operational discharge include: cooling tower blowdown (NPDES 005); demineralizer regeneration wastes; flue gas desulfurization (FGD) system blowdown and other low volume wastewater streams (NPDES 006); metal cleaning wastes (NPDES 007); coal and limestone storage area runoff (NPDES 006); ash and FGD solids handling and temporary storage area runoff (NPDES 006); sanitary wastes NPDES 003); active solid wastes landfill runoff (NPDES 006); and miscellaneous (mostly oil-bearing) wastes (NPDES 008). Most of these wastewater streams with the exception of metal cleaning wastes, cooling tower blowdown, sanitary wastes, and miscellaneous wastes, will be combined prior to treatment in the plant's chemical wastewater treatment facility. The metal cleaning waste stream will be treated separately from other wastes to assure it has met applicable USEPA iron and copper limits for this wastewater stream. Cooling tower blowdown will not be treated and will be combined with the treated wastewater streams prior to discharge. Oil bearing wastes will be collected and treated in oil/water separators prior to the water portion being directed to the main pump sump after the wastewater treatment system. The flow characteristics and anticipated treatment for each of the major waste streams and contaminated runoff streams are summarized in Tables 2.2-2 and 2.2-3, respectively. Raw wastewater characteristics typical of several of the major wastewater streams are presented in Table 2.2-4.

Table 2.2-2. Summary of SJRPP wastewater streams and their anticipated control requirements (JEA/FP&L 1981b).

Wastewater Source	Flow Rate (gpm) Avg.	Flow Rate (gpm) Max.	Discharge to	Control Required for
Central Wastewater Treatment Facility	1,251	3,600	NGS Discharge Channel	TSS, pH, Metals
Sanitary Wastewater	11	240	Package Sewage Treatment Facility/NGS Discharge Channel	BOD, Coliform, TSS, pH
Boiler Blowdown	91	510	FGD System Makeup	
FGD Blowdown and Cleaning	1,038	3,736	Flow Equalization Pond/ Central Wastewater Treatment Facility	TSS, pH
Demineralizer and Polisher Regenerants	27	715	Flow Equalization Pond/ Central Wastewater Treatment Facility	TSS, pH
Boiler Metal Cleaning Wastes[1]	33	500	Metal Cleaning Waste Retention Basin/Central Wastewater Treatment Facility	TSS, Metals, pH
Pump Bearing Cooling and Sealing Water	50	50	Individual Sumps or Pump Intakes	
Bottom Ash Sluicing System	100	100	No Discharge/Fly Ash Wetting[2]	
Equipment Washing, Floor Drains	25	250	Oily Waste Collection Pond/ NGS Discharge Channel	TSS, Oil and Grease
Blount Island Sanitary Wastewater	1	2	Jacksonville Port Authority System	BOD, Coliform TSS, pH

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[1] This wastewater stream is encountered only occasionally during scheduled maintenance of the plant.

[2] The bottom ash sluicing system will have to be blown down occasionally during the life of the plant. In such a case, the wastewater will be directed to the central wastewater treatment facility.

Table 2.2-3. Summary of SJRPP contaminated runoff sources and anticipated controls (JEA/FP&L 1981b).

Area	Size	Average Runoff (gpm)	Maximum Runoff (gpm)	Discharge to
Coal Handling and Storage	42 acres	119	6,047	Coal Pile Runoff Sedimentation Pond/Central Wastewater Treatment Facility
Limestone Handling and Storage	6 acres	17	861	Coal Pile Runoff Sedimentation Pond/Central Wastewater Treatment Facility
Landfill (Active)	10 acres	6	140	Sedimentation Pond/Central Wastewater Treatment Facility
Landfill (Test Cell)	5 acres	2	70	Sedimentation Pond/Central Wastewater Treatment Facility
Solid Waste Handling and Temporary Storage	3 acres	9	70	Sedimentation Pond/Central Wastewater Treatment Facility
Light Oil Storage and Truck Unloading	1 acre	3	200	Oil/Water Separator/Oily Waste Collection Basin/Discharge
Coal and Limestone Service Area	16,533 ft^2	1	150	Oil/Water Separator/Oily Waste Collection Basin/Discharge
ID and FD Transformer Area	14,000 ft^2	1	100	Oil/Water Separator/Oily Waste Collection Basin/Discharge
Main Transformer Area	5,000 ft^2	1	100	Oil/Water Separator/Oily Waste Collection Basin/Discharge
Blount Island Coal Storage Area	35 acres	100	5,070	Sedimentation Pond/Percolation Pond

Table 2.2-4. Typical chemical characteristics of raw wastewater streams from the SJRPP (JEA/FP&L 1981b).

Parameter	Cooling Tower Blowdown	FGD Blowdown	Demineralizer Blowdown	Landfill Area Runoff	Coal Pile Area Runoff
gpm	23,900	1,000	15	6	119
	Avg.	Avg.	Avg.	Avg.	Avg.
Chlorides, mg/l	18,740	6,905	149	59	10
Sulfates, mg/l	2,500	10,000	8,000	766	5,000
Calcium, mg/l	391	3,000	394	130	300
Iron, mg/l	1.1	8.1	0.178	1.2	200
Magnesium, mg/l	1,215	2,750	162	4.3	---
Potassium, mg/l	385	32	8.17	---	---
Sodium, mg/l	10,300	2,400	2,200	---	---
Cyanide, mg/l	0.01	---	---	< 0.01	---
Aluminum, mg/l	0.703	0.3	0.131	0.9	---
Antimony, μg/l	0.27	2,300	---	---	---
Arsenic, μg/l	0.99	300	7.1	15	150
Beryllium, μg/l	0.13	140	---	< 7	---
Boron, mg/l	4.5	46	2.91	---	---
Cadmium, μg/l	0.42	110	5.68	1.8	1
Chromium, μg/l	2.3	500	---	<10	5
Copper, μg/l	100	200	28.4	23	900
Lead, μg/l	0.5	400	149	12	10
Manganese, μg/l	39.3	2,500	14.2	---	30,000
Mercury, μg/l	0.35	70	0.71	0.46	0.5
Nickel, μg/l	4.8	1,500	24.9	64	---
Selenium, μg/l	0.72	2,200	35.5	< 10	5
Silver, μg/l	0.23	60	2.84	10	---
Zinc, μg/l	66.6	350	49.7	50	6,500
Barium, μg/l	---	---	---	---	170

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[1] Coal pile runoff characteristics for typical eastern Kentucky and eastern Tennessee coal such as that being considered for use at SJRPP.

2.2.8 Solid Waste Handling and Disposal

Large volumes of solid wastes will be generated at the proposed SJRPP facility by the FGD system and the fly ash and bottom ash collection systems. Smaller volumes of semi-solid sludges will be generated by the cooling towers and the various wastewater treatment systems. All of the high volume residues will be commingled and disposed of on-site if they cannot be sold as marketable by-products. A summary of solid waste generation and disposal at the SJRPP is presented in Table 2.2-5 (JEA/FP&L 1981b).

JEA and FP&L propose a five-year testing program to determine the most acceptable means of solid waste disposal. The test program will be carried out using a 5 acre test cell with a plastic liner and monitoring wells. However, current plans call for developing more than 551 acres of available landfill area in 10-acre cells. Sludge and ash waste not involved in the test cell program will be disposed of in the main landfill cells. This area will be sufficient to dispose of all solid waste generated at the SJRPP over its projected 40-year life. Cells will be constructed above the water table and the bottom material as well as the waste will be compacted in layers to minimize leachate. Berms and ditches will be constructed around the cells to divert site runoff away from the landfill area. Runoff from the cells themselves will be collected and treated in sedimentation ponds and routed to the chemical wastewater treatment system. When the layers of waste material and cover soil have reached a height of about 60 feet, the cells will be capped off with gravel and then soil, sloped, and seeded. A groundwater monitoring program will be initiated prior to construction and continued over the life of the landfill to determine if any contamination of the groundwater by leachate is occuring. Construction trash will be disposed in the City landfill adjacent to the plant site.

2.2.9 Transmission Facilities

Two 230 kV transmission lines will be constructed from the SJRPP site to the Normandy Substation on the west side of Jacksonville and two other 230 kV lines will be constructed from the SJRPP to the Fort Caroline and Robinwood Substations on the east side of Jacksonville. The preferred corridor follows existing transmission line rights of way (ROW) over more than 90% of its length (Figure 2.2-9). Where the new lines follow existing ROW, it is anticipated that the existing ROW will be expanded by 150 feet in width to accommodate the new lines. Where new ROW is required, its width will be approximately 200 feet.

2.2.10 Resource Requirements

The major resource requirements of the SJRPP on a yearly and lifetime basis are summarized in Table 2.2-6. Coal will be burned in the main boilers, fuel oil will be burned in the auxiliary boilers, and limestone will be used in the FGD system. Consumptive uses of groundwater include boiler makeup, fly ash handling, FGD system evaporation and sludge generation, and a small amount for plant personnel. Evaporation from the main condenser cooling towers will be the only consumptive use of surface water.

Table 2.2-5. Solid waste generation and disposal for the SJRPP (JEA/FP&L 1981b).

Solid Waste	Maximum Production Rate (tons/hour)	Total[1] Mass (tons x 10^6)	Total Volume (acre-feet)	Disposal
Bottom Ash	20	1.99	1,140	Sold as construction aggregate or landfilled on-site
Fly Ash	81	7.95	6,080	Sold as a by-product or landfilled on-site
FGD Sludge (gypsum)	134	17.2	12,400	Sold as wallboard grade gypsum or landfilled on-site
Equilization Basin and Sediment Pond Solids	NS[2]	NS[2]	NS[2]	Landfilled on-site
Domestic Wastewater Treatment Sludges	NS[2]	NS[2]	NS[2]	Landfilled off-site
Oil and Grease	NS[2]	NS[2]	NS[2]	Sold to oil recovery vendors or disposed of off-site
Metal Cleaning Sludges	NS[2]	NS[2]	NS[2]	Disposed of off-site by RCRA approved disposal service or codisposed with high volume waste on-site
Construction Trash	NS[2]	NS[2]	NS[2]	Duval County landfill

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[1] Estimates based on a 40-year plant life and an estimated capacity factor of 0.60.

[2] The volumes of these wastes are unknown at this time but are considered to be relatively insignificant compared to the volume of the high volume wastes.

Figure 2.2-9. Preferred transmission line corridors of the SJRPP (JEA/FP&L 1981a).

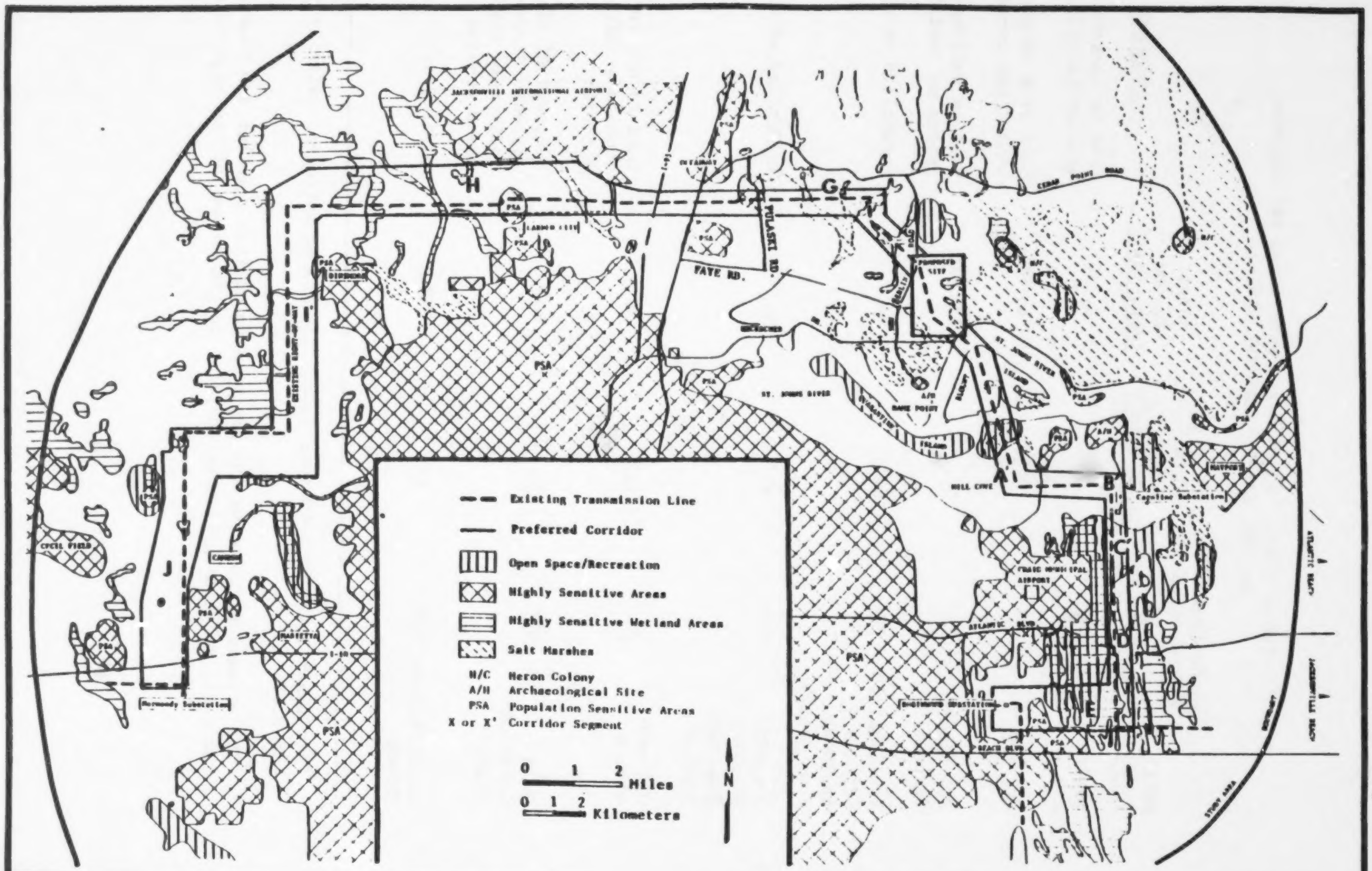

Existing Transmission Line
Preferred Corridor
Open Space/Recreation
Highly Sensitive Areas
Highly Sensitive Wetland Areas
Salt Marshes
H/C Heron Colony
A/H Archaeological Site
PSA Population Sensitive Areas
X or X' Corridor Segment
0 1 2 Miles
0 1 2 Kilometers
N
JACKSONVILLE INTERNATIONAL AIRPORT
CEDAR POINT ROAD
PULASKI RD.
FAYE RD.
ST. JOHNS RIVER
HILL COVE
ATLANTIC BLVD
BEACH BLVD
CRAIG MUNICIPAL AIRPORT
MAYPORT
ATLANTIC BEACH
JACKSONVILLE BEACH
STUDY AREA
I-10
Normandy Substation
Cecil Field
Marietta
PSA
A
B
C'
D
E
G
H
I'
J

Table 2.2-6. Major resource requirements of the SJRPP (JEA/FPL 1981a,b)

Resource	Consumption Per Year	Total Consumption[1,2]
Coal	3,500,000 tons	95,700,000 tons
Fuel Oil	4,255 barrels	169,000 barrels
Limestone	214,000 tons	8,600,000 tons
Surface Water	3.3 billion gallons[1]	132.7 billion gallons
Groundwater	0.8 billion gallons[1]	33.4 billion gallons

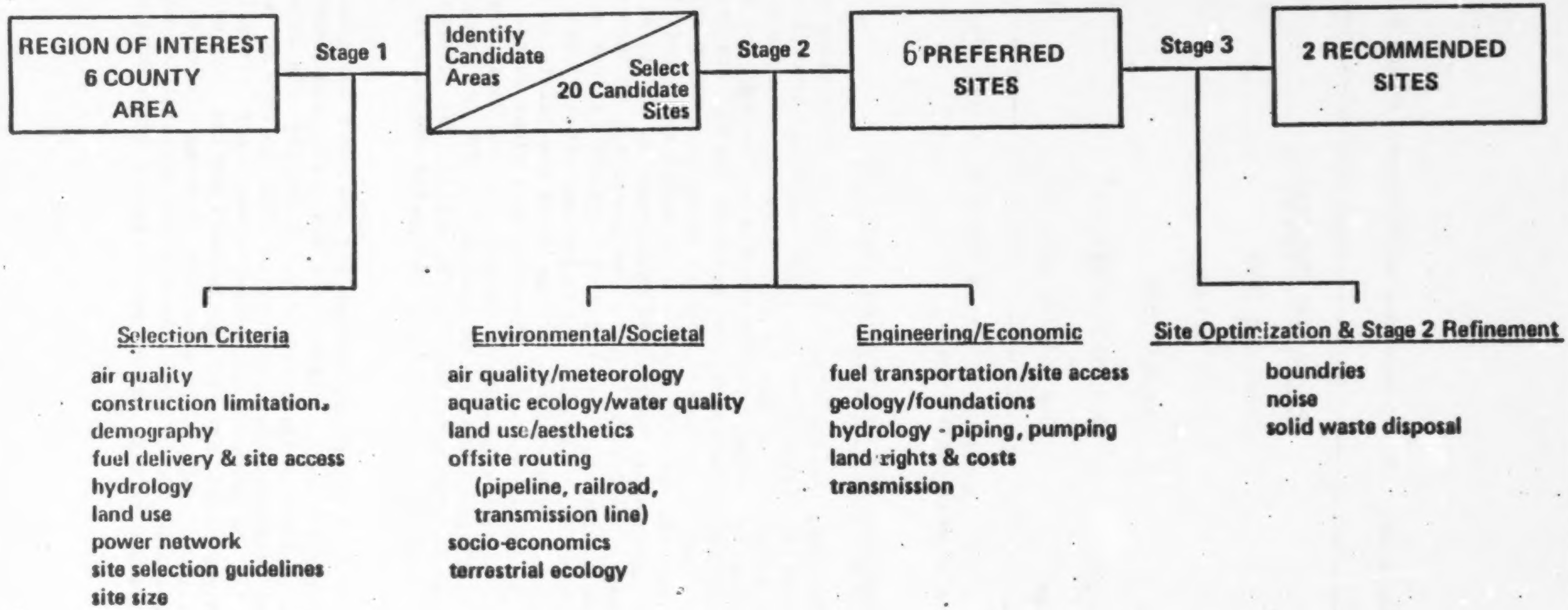
[1] Assumes a 60% capacity factor over the life of the plant.
[2] Assumes a 40-year plant life.

2.3 ALTERNATIVE SITE ANALYSIS AND SELECTION

In Florida, the selection of potential power plant sites by a utility with subsequent critique by the State commences several years before the filing of a Site Certification Application as required by the Florida Power Plant Siting Act. Each utility has its own methods for developing energy forecasting requirements and the means to fulfill its service area's energy demands including the development of power generation stations. Utility planning methods for both energy forecasting and plant site requirements are disclosed in Ten-Year Site Plans which must be submitted to the State each year. When a utility feels that new generation is necessary, it begins a site evaluation process for both existing stations (if the utility has existing generation capabilities) and potential new sites. Basic environmental and socioeconomic information about the sites are initially provided to the State in the Site Plans, with more specific data given as the site analysis process continues. The State provides comments to the Department of Veteran and Community Affairs (DVCA) to be included in DVCA's formal review of each plan. This review is then sent back to the utility for integration with its planning effort. Eventually, the utility designates one site as the preferred site for certification efforts.

JEA's site selection process for the SJRPP has gone through three major stages (Figure 2.3-1). Plans for a new coal-fired power plant have been included in JEA's plans since 1978. Initially, JEA hired the consulting firm of United Engineers and Constructors (UEC) in 1977 to perform site selection studies for the proposed coal-fired power plant. From 20 candidate areas within Duval County and its contiguous counties, UEC selected six preferred sites (Figure 2.3-2). The selection of these six sites was based on a preliminary evaluation of environmental and societal compatibility and costs. The next stage in UEC's study was to select the preferred and alternate sites.

Figure 2.3-1. An overview of the Jacksonville Electric Authority St. Johns River Power Park site selection process (JEA 1977a).


REGION OF INTEREST 6 COUNTY AREA
Stage 1
Identify Candidate Areas
Select 20 Candidate Sites
Stage 2
6 PREFERRED SITES
Stage 3
2 RECOMMENDED SITES
Selection Criteria
air quality
construction limitation.
demography
fuel delivery & site access
hydrology
land use
power network
site selection guidelines
site size
Environmental/Societal
air quality/meteorology
aquatic ecology/water quality
land use/aesthetics
offsite routing
(pipeline, railroad, transmission line)
socio-economics
terrestrial ecology
Engineering/Economic
fuel transportation/site access
geology/foundations
hydrology - piping, pumping
land rights & costs
transmission
Site Optimization & Stage 2 Refinement
boundries
noise
solid waste disposal

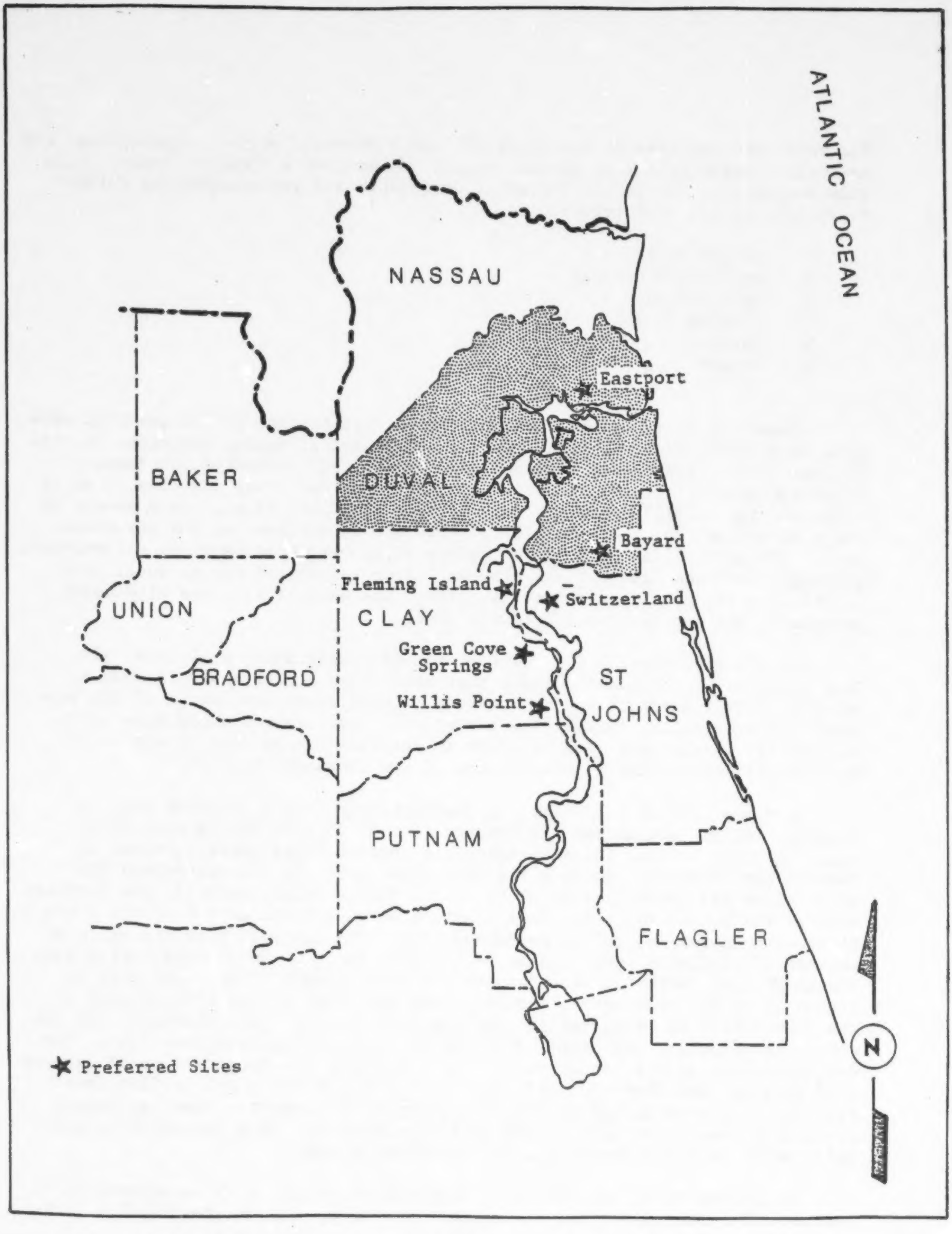

ATLANTIC OCEAN
NASSAU
Eastport
BAKER
DUVAL
Bayard
Fleming Island
Switzerland
UNION
CLAY
Green Cove Springs
BRADFORD
ST JOHNS
Willis Point
PUTNAM
FLAGLER
N
Preferred Sites

Figure 2.3-2. Map of study area showing location of six final preferred sites selected in phase 2 of the JEA site selection process.

UEC made the selection by analyzing the environmental, social, engineering, and economic considerations in greater detail and on a site specific basis. From this evaluation, UEC ranked the sites as follows and recommended the Willis Point Site as the most preferable:

1. Willis Point
2. Green Cove Springs
3. Switzerland
4. Fleming Island
5. Eastport
6. Bayard

Subsequent to this report, additional investigations by JEA and FP&L were made which resulted in revised cost and environmental impact estimates for the various sites. Because of this new information, UEC conducted additional investigations of other alternative sites in Clay and Duval Counties. One of these was the Walkill site, located adjacent to Willis Point. As a result of UEC's investigation, the Willis Point site was reconfirmed as the preferred site. The Walkill and Green Cove Springs sites were considered as alternatives although the Green Cove Springs site was later eliminated due to local preference for its use as an industrial site. The Walkill site was eliminated because it was not available from the owner.

The JEA authorized UEC to perform an additional study on 4 June 1979. This study was to consider changes that might have occurred with regard to economic, environmental, and engineering factors since completion of the previous two studies and to evaluate the effect these changes would have on the suitability of the Duval County sites in relation to the Clay County sites. The results did not change the ranking of the recommended sites.

On 9 August 1979, JEA signed a contract with EBASCO Services Inc. to license, design, and manage the construction of the two 600 MW coal-fired electric power units. The firm agreed to conduct field investigations on three sites until the JEA made its site selection. It was determined the three sites for investigation would be the Willis Point, Walkill, and Eastport sites. The Willis Point and Walkill sites were selected as two of the three final sites based on the UEC recommendation. The Eastport site was selected because JEA believed that site to be the most suitable Duval County site even though UEC had ranked it second among the Duval County sites. JEA also believed it to be important to further study the Duval County site because of the possibility of being restricted from Clay County. In particular, the JEA faced strong public opposition from the Clay County Citizens Coalition. The Coalition presented a letter to the JEA Site Selection Committee on 17 January 1980 stating that they would strongly oppose siting the plant in Clay County and that they were backed by powerful grass roots support. The Clay County sites were also zoned agricultural and rezoning could have caused an indefinite delay in the construction of the proposed plant.

In October 1979, the JEA Board formed a committee of three members to evaluate the three sites and recommend a preferred site to the Board in early

February 1980. Their evaluation was based on the results of the site selection studies completed by UEC and a series of Site Selection Committee meetings held between 2 November 1979 and 29 January 1980. The primary reasons presented by JEA for choosing the Eastport site as the final preferred site were as follows:

- Consideration of additional payments in lieu of taxes to Clay County made the Eastport site less costly over the life of the plant.
- The Eastport site was zoned for heavy industrial development which was compatible with power plant development.
- The potential for delays with rezoning the Clay County sites was greater than for the Eastport site.
- The Clay County Board of County Commissioners was on record as opposing the plant.
- The air quality problems associated with the Eastport site were determined not to be a major obstacle to licensing.
- Accessibility by oceangoing barges made the Eastport site more attractive from strategic and economic standpoints.

At the final meeting on 29 January 1980, the Committee unanimously selected the Eastport site for the proposed JEA coal-fired power plant. The JEA Board then accepted the Committee recommendation at the 5 February 1980 meeting.

In summary, the JEA conducted a reasonably thorough study of a large number of alternative sites within the Authority's service area. Even though the two Clay County sites were rated above Eastport from an environmental standpoint, the JEA faced strong political opposition to building the plant in Clay County. In addition, one of the Clay County sites was determined to be unavailable from the owner. Throughout the site selection process, it was recognized that the Eastport site contains sensitive features and is proximal to other environmentally sensitive area. It was also recognized throughout the process that a higher degree of environmental control and more careful development would be required if the Eastport site were selected rather than one of the more environmentally preferrable sites.

2.4 ANALYSIS OF ALTERNATIVE TRANSMISSION PLANS FOR THE PROPOSED PROJECT

Through an analysis of transmission system stability, JEA and FP&L determined that the electric power generated by the SJRPP should be tied into the existing JEA power grid with the following combination of lines, voltages, and tie-in points (JEA/FP&L 1981a):

- Two 230 kV lines to the Normandy Substation
- One 230 kV line to the Robinwood Substation
- One 230 kV line to the Fort Caroline Substation

These tie-in points are shown in the existing transmission system grid map (Figure 2.4-1). A number of alternative corridors for constructing the required transmission lines have been identified for study. Because determination of a specific right-of-way (ROW) depends on a number of site-specific factors including obtaining easements, foundation engineering considerations, and costs, only generalized transmission corridors have been identified at this time. The actual transmission line ROW will eventually be identified within these corridors.

2.4.1 Corridor Identification and Evaluation Criteria

The Florida Transmission Line Siting Act (Section 403.52-536, Florida Statutes) and its companion rule, Chapter 17-17, Part II, F.A.C., identifies the minimum criteria which must be studied in the review of a proposed transmission corridor. Although the Transmission Line Siting Act is not directly applicable to SJRPP and it's associated transmission lines, its criteria provide a helpful guide in corridor selection. These include:

- impacts of line crossings of navigable waters and transportation systems;
- impacts on land use and neighboring populations;
- impacts on public lands, submerged lands, and wetlands;
- impacts on terrestrial and aquatic ecology;
- impacts on threatened and endangered species;
- impacts on known or potential archaeological and historic resources;
- impacts on previously undisturbed lands;
- potential electromagnetic effects;
- impacts on air quality;
- impacts on water quality;
- impacts of construction;
- methods of ROW maintenance; and
- mitigative measures.

Other local, State, and Federal agencies have similar evaluation criteria which must be taken into account in the evaluation of alternative transmission corridors and the selection of a final ROW through the selected corridor. Based on these evaluation criteria as well as system stability studies and cost and engineering studies, a set of guidelines was established by JEA for

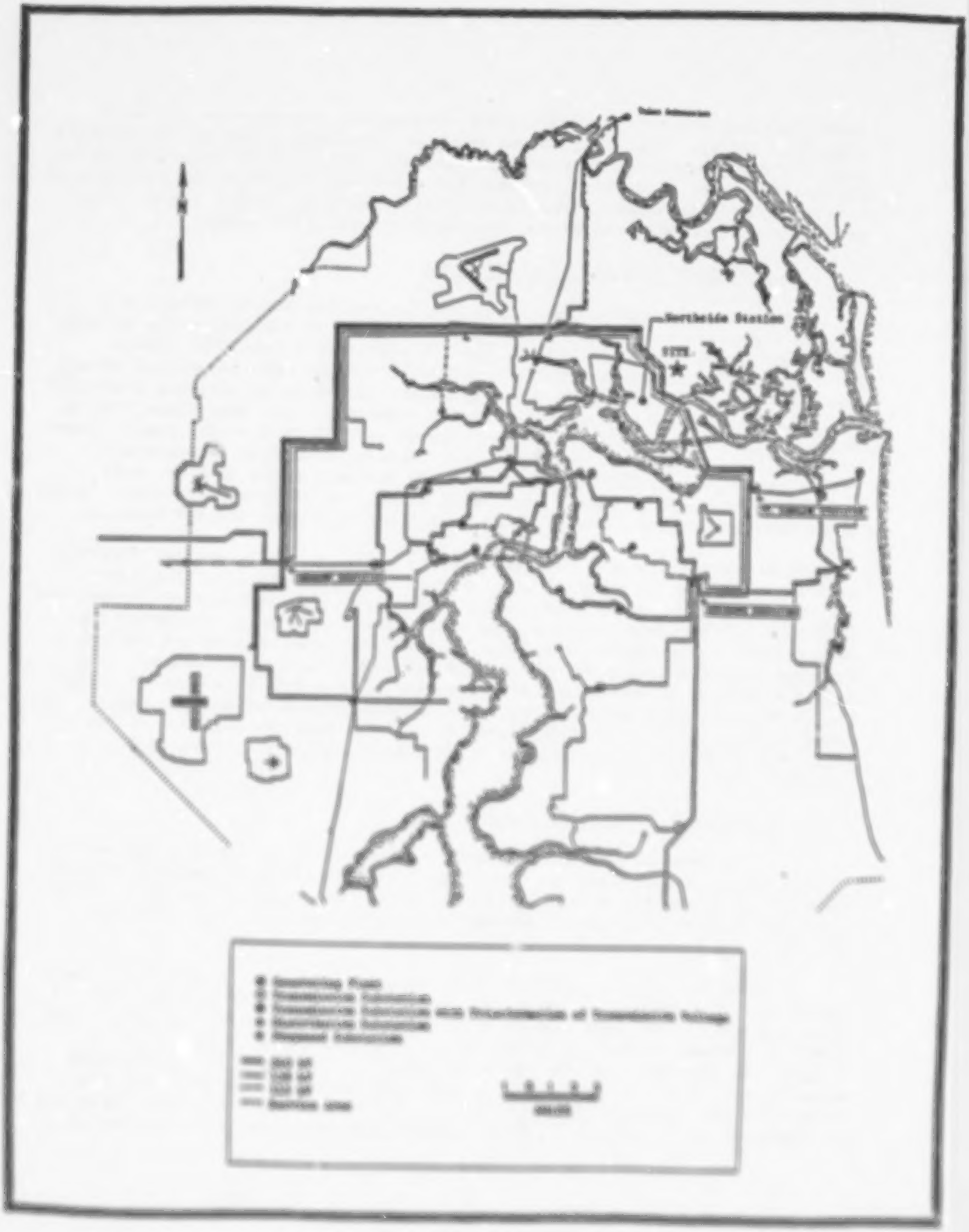

Northside Station
SITE
N
Generating Plant
Transmission Substation
Transmission Substation with Transformation of Transmission Voltage
Distribution Substation
Proposed Substation
230 kV
138 kV
69 kV
Service area
MILES

Figure 3.4-1. JEA's existing transmission system (JEA/FPUG, 1981a).

identification and review of potential alternative transmission corridors (JEA/FP&L 1981a). These guidelines include: following existing transmission line ROW where possible; avoidance of wetlands (particularly wooded wetlands), floodplain areas, endangered species, and important habitats; and avoidance of sensitive land use areas (airports, property ownership, public lands), historical and archaeological sites, and important aesthetic areas.

2.4.2 Alternative Corridor Identification

Based on the criteria identified and inputs from the literature and various agencies, the Jacksonville area was mapped to identify areas of high sensitivity, moderate sensitivity, and low sensitivity (JEA/FP&L 1981a). Based on this analysis, alternative corridor routings were identified between the SJRPP and the appropriate substations with emphasis on avoiding sensitive areas (Figure 2.4-2). In general, highly sensitive areas were identified as zones of high to medium existing or proposed population density, public lands, wooded wetlands, airports, and important cultural resources. Moderately sensitive areas were identified as zones of low population density, salt marshes, non-wooded wetlands, open water areas, and recreational lands. Other areas were considered to be of relatively low sensitivity for ROW location.

Highly sensitive zones represent areas which should be avoided entirely or traversed by a transmission line only with utmost care (JEA/FP&L 1981a). If these areas must be crossed, additional mitigation, engineering design, and land acquisition costs should be expected. Moderately sensitive zones represent areas which should be avoided if practical alternatives are available. Zones of low sensitivity do not warrant special avoidance procedures. The latter areas may include small sensitive components such as stream crossings, but it was assumed these areas could be spanned without measurable impact. A detailed description of the application of these zone restrictions to the selection of alternative corridors is presented in the EID, Section 9.6 (JEA/FP&L 1981a).

2.4.3 Corridor Evaluation and Selection

Prior to selection, all corridors were inspected by airplane and on-site surveys were made in sensitive locations (JEA/FP&L 1981a). Comparative findings for each segment (designated A, A', B, B', etc.) are presented in Table 2.4-1 which identifies the advantages and disadvantages of each corridor routing.

In general, for the SJRPP to Fort Caroline corridors (A and A'), A' was judged superior because it parallels the existing transmission ROW, would cost less, and would have less impact on wetlands and open aquatic habitats. The SJRPP to Robinwood Substation corridors (B, B', C, C', D, E and E') also include the Fort Caroline corridors (A and A'). Of these, B' and C'D were selected over B and CD because they contained slightly less wetlands, fewer areas of high population density, and C' contains the existing ROW. Corridor E is preferred to E' because it would involve less clearing of wooded wetlands.

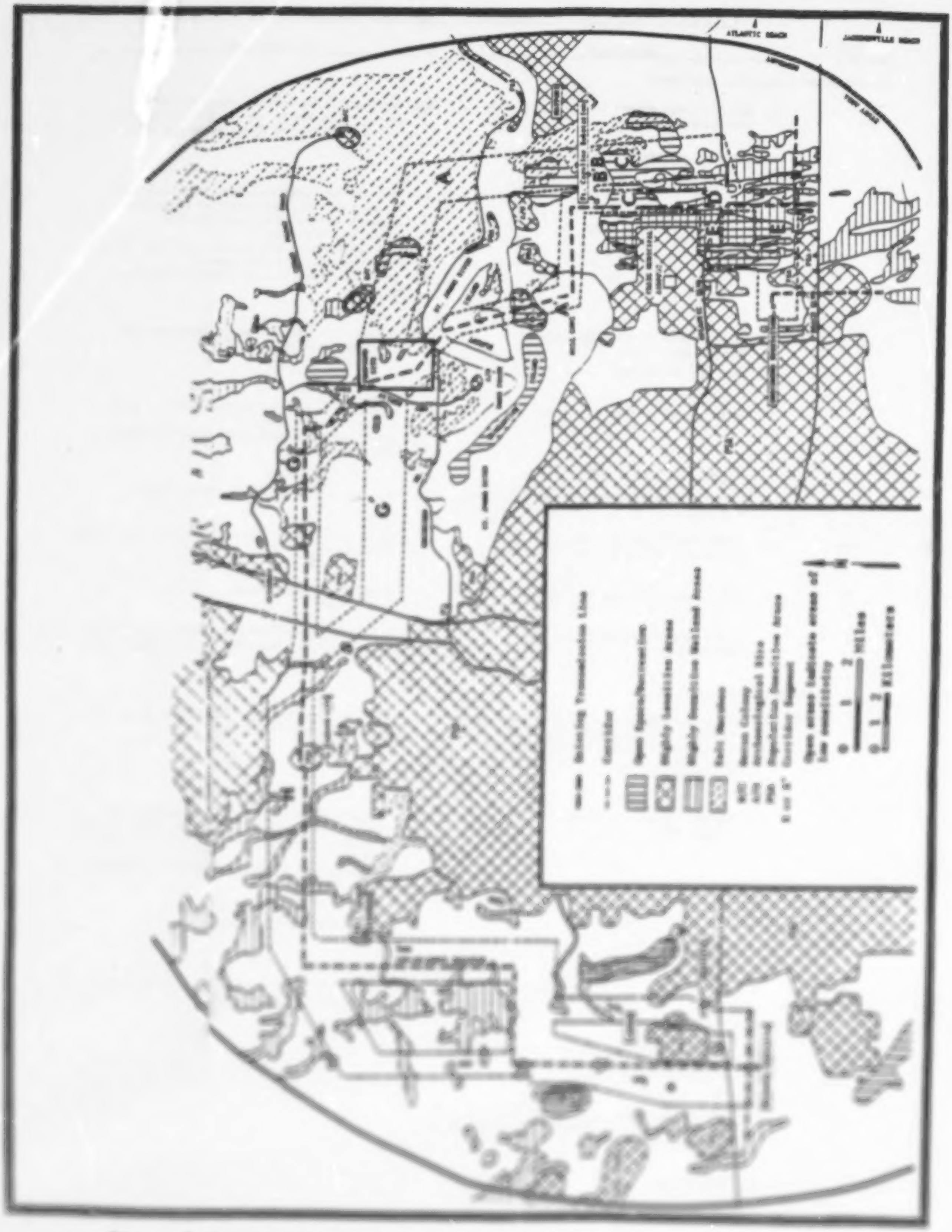

ATLANTIC BEACH
JACKSONVILLE BEACH

Figure 3.4. Sensitive areas and alternative transmission corridors for the SJRPP (JEA/FP&L 1981a).

Table 2.4-1. Environmental assessment of alternative transmission line corridors.

Corridor Segment[a]	Advantages	Disadvantages
I. Robinwood Substation from Plant		
A	1. Crosses large amount of disturbed (low sensitivity) land. 2. Includes existing right-of-way (ROW).	1. Spoil areas are nesting areas for least terns, which may be temporarily disturbed during construction phase (moderate sensitivity).
A		1. Over 90% wetland, including large expanses of salt marshes, and estuarine biological communities (moderate sensitivity). 2. Long river crossing. 3. Much more costly due to tower and foundation conditions and corridor length. 4. Aesthetic impacts to Ft. Caroline National Monument.
B'	1. Large amount of pine flatwoods (low sensitivity area). 2. Existing ROW present.	1. Relatively large hardwood swamp component (high sensitivity).
B	1. Large amount of pine flatwoods.	1. Large amount of salt marsh (moderate sensitivity), higher cost. 2. Large amount of residential area (moderate sensitivity).
C'D	1. Contains large amounts of pine flatwoods. 2. ROW present.	1. Contains large amount of hardwood swamp.
CD	1. Large amounts of pine flatwoods and sandhill communities (low sensitivity).	1. Large amounts of hardwood swamp and salt marshes. 2. Higher cost.
E'	1. Large amount of pine flatwoods.	1. Over 75% hardwood swamp. 2. Higher cost.
E	1. Large amount of pine flatwoods. 2. ROW present.	1. Approximately 55% hardwood swamp; some freshwater marsh and hammock (moderate sensitivity).
II. Plant to Normandy Substation		
E	1. Large amounts of agricultural and upland biological communities. 2. Small overall amount of wetlands and estuaries. 3. ROW present.	1. Area is approximately 10% hardwood swamp. 2. Higher population density.
F'	1. Larger acreages of upland biological communities.	1. Wetlands total 20% of area, including areas of hardwood swamp, swamp hammock, cypress pond, freshwater marsh, rivers, streams, and salt marshes. 2. Wetland areas include more estuary crossings. 3. Higher cost.
G (Northern half)		1. [illegible] wetland crossings.
G (Southern half)	1. ROW present.	1. Small area [illegible] population density [illegible].
[illegible]	1. [illegible] 2. [illegible]	
[illegible]	1. [illegible] 2. [illegible]	
[illegible]	1. ROW present. 2. [illegible]	
[illegible]		1. [illegible] 2. [illegible]

---

[a] [illegible]

Corridor G is preferred over G' as the first segment of the Normandy Substation route because it includes the existing ROW, is less costly for tower construction, and crosses fewer estuarine and wetland areas. Corridor G, however, would cross a major population center near Pulaski Road. The southern half of the corridor segment appears to be more promising than the northern half because it includes the existing ROW and includes less wetland acreage. This route, however, does involve an Interstate Highway crossing and crosses an area planned for future medium to high density development. Corridors I' and J are preferred over their alternatives primarily because they contain existing ROW.

The preferred corridor includes the existing ROW and alternate Segments A', B', C', D, and E from the site to Robinwood Substation and Segments G, H (southern half), I', and J to the Normandy Substation (Figure 2.2-10). In addition, aerial photographs of the preferred corridor including identification of nearby sensitive areas are provided in the EID, Appendix K (JEA/FP&L 1981a). The new ROW through the selected corridor will normally be 150 feet to 200 feet in width. As the ROW approaches sensitive areas, it may be constricted to minimize impact. New maintenance roads will generally be required only where the new ROW will not be adjacent to the existing ROW. All transmission line ROW will be cleared and maintained in accordance with the National Electrical Safety Code (JEA/FP&L 1981a).

Four relatively sensitive areas exist within the preferred corridor. The area near Pulaski Road (Segment H) has a medium to high population density. The ROW through this corridor will closely parallel the existing ROW and transmission towers will be modified to minimize impacts on this area (JEA/FP&L 1981a). The area near Interstate 295 which is zoned for future medium high density development will be protected by maintaining close ROW alignment with I-295. Similar measures will be used to minimize impacts on the golf course north of Craig Field in Segment A' and at Sandalwood High School near the Robinwood Substation.

2.4.4 Transmission Line Structures

Transmission line structures will differ little from those currently in use by JEA (JEA/FP&L 1981a). Single steel pole transmission towers may be used where narrow ROW, resistance to differential settling, or resistance to high winds is required. Steel or concrete H-frame structures may be used where differential settling is not a problem. Lattice-type steel towers will be used at river crossings due to the increased tower height requirements in these locations. Substations will not change in size or appearance as a result of constructing the new lines.

2.5 ALTERNATIVE PROCESSES AND FACILITIES FOR THE PROPOSED PROJECT

Within the framework of the standard 600 MW power plant being proposed for the SJRPP, alternatives were developed and evaluated critically for every major aspect of plant design for which some flexibility existed (EBASCO 1978 in JEA/FP&L 1981a). The alternative processes considered in this section are limited to the environmental controls which are required to meet standards or the design of those plant units which are of environmental concern. For each system, an attempt has been made to describe alternatives which deserve serious consideration and to describe the advantages and disadvantages of each. In each case the applicant's preferred alternative has been identified and reasons for the preference stated.

2.5.1 Condenser Cooling Systems

2.5.1.1 Cooling Facilities

A wide range of alternative cooling systems was initially considered for potential use at the SJRPP. Based on the initial screening, it was concluded that once-through cooling and closed cycle evaporative cooling would be most applicable for use at the proposed site (JEA/FP&L 1981a). Other cooling systems including dry cooling towers, wet-dry combination cooling towers, cooling ponds, and spray ponds were eliminated in the initial analysis for a number of reasons. Dry cooling towers are approximately an order of magnitude more expensive than wet towers and are generally used only where cooling water is in short supply. Wet-dry towers are more expensive than evaporative cooling towers and offer little advantage with respect to water use or ground fogging. Cooling ponds and spray ponds require larger land areas than are available in the vicinity of the SJRPP. Following the initial screening, a more detailed analysis was performed on once-through cooling and several closed cycle evaporative cooling systems.

Upon further analysis, once-through cooling was eliminated because of potential conflicts with the NPDES permit for the NGS once-through cooling system and the costs associated with avoiding such conflicts. To avoid adverse impacts in the St. Johns River from two thermal discharges in close proximity to each other, it was estimated that the intake and discharge lines for the SJRPP would have to be 10,500 feet and 19,500 feet in length, respectively (JEA/FP&L 1981a). It was also estimated that over the life of the plant, construction and operation of a once-through system of this size would cost $35 to $40 million more than a comparable closed cycle evaporative cooling system. Because of its higher cost and greater impact on the St. Johns River, the once-through option was eliminated from further consideration.

A comparison of three types of closed cycle, counterflow evaporative cooling towers was conducted to select a preferred cooling system. The findings of the comparison are summarized in Table 2.5-1. Natural draft cooling towers generally are higher in capital cost but lower in operating cost and energy consumption than rectangular and round mechanical draft cooling towers. Consequently, the natural draft towers are slightly less expensive on an annualized equivalent cost basis.

There are also environmental differences among the various design. Natural draft towers exhibit a higher vapor plume rise and a longer drift. Because of their greater height, however, the vapor plume reaches the ground at a distance and the potential for ground fogging as compared to mechanical draft towers is reduced. Drift deposition of dissolved solids from the use of salt water would be low in all three cases since drift eliminators would be used. However, the use of a natural draft tower would result in a lower concentration of drift deposition over a somewhat larger area than for the

Table 2.5-1. Comparison of economic, engineering, and environmental characteristics of alternative cooling systems for the SJRPP (JEA/FP&L 1981a).

Characteristic	Natural Draft Cooling Towers	Rectangular Mechanical Draft Cooling Towers	Round Mechanical Draft Cooling Towers
Capital Cost ($\$ \times 10^6$)	46.178	36.703	37.155
Annualized Cost ($\$ \times 10^6$)	10.660	12.163	11.857
Energy Consumption (Net MW-hours/yr)	base	+12,145	+14,035
Vapor Plume	higher rise, longer drift	moderate rise and drift	moderate rise and drift
Ground Fog Potential	moderate to low	higher	higher
Drift	longer drift lower concentration	shorter drift higher concentration	shorter drift higher concentration
Structural Aesthetics	tall (360-550 ft)	moderate (60-100 ft)	moderate (60-100 ft)

other cooling systems. Overall, the natural draft towers are considered more desirable because of their reduced cost, energy consumption, and the reduced potential for ground fogging (JEA/FP&L 1981a).

2.5.1.2 Cooling Water Sources

The maximum makeup flow rate required for the natural draft evaporative cooling towers is estimated to be approximately 34,400 gpm (JEA/FP&L 1981a). Cooling water is potentially available from groundwater and the St. Johns River. Groundwater was eliminated as a possible source early in the evaluation because of the potential increase of salt water intrusion into the Floridan Aquifer that could result from such a large withdrawal. This use also would be inappropriate for such a high quality source of water which could be better used for potable water or manufacturing and other sensitive processes.

Two possible means of obtaining cooling water from the St. Johns River were examined: direct withdrawal from the Blount Island Channel; and withdrawal from the existing once-through cooling system serving the NGS. Withdrawal from the NGS canal would eliminate the impacts associated with construction of new intake facilities in the River and would reduce or eliminate additional impingement and entrainment of organisms from the St. Johns River (Table 2.5-2). Because of reduced environmental effects and reduced costs associated with construction, the option of withdrawing cooling water from the NGS discharge canal was selected (JEA/FP&L 1981a).

2.5.1.3 Cooling Water Discharge Alternatives

Including the 34,400 gpm cooling water discharge and the various plant wastes, a maximum of 36,700 gpm would be discharged from the SJRPP. The St. Johns River is the only body of water of sufficient size in the vicinity of the SJRPP to receive this flow rate. The proposed discharge could be routed there either by a new pipeline and discharge structure or by utilizing the existing NGS discharge canal and Y-nozzle diffuser. As in the case of the cooling water source, use of the NGS discharge canal presents several distinct advantages as compared to construction and operation of a new discharge structure (JEA/FP&L 1981a). Based on the minimization of thermal plume entrainment, thermal plume attraction, cold shock, salinity, and biocidal and chemical effects offered by use of the NGS discharge canal (Table 2.5-3), the canal has been selected as the discharge point for the SJRPP.

2.5.2 Air Pollution Control Systems

The air pollution control systems are designed to reduce air pollution emissions from the project as well as minimizing energy requirements, capital costs, and the generation of water pollutants and solid wastes (JEA/FP&L 1981a). The evaluation of emission control alternatives with regard to energy, environmental, engineering, and economic objectives is a requirement of the BACT portions of the applicable Federal PSD Regulations [(43 FR 118:26379-26410, 19 June 1978], and their counterparts in the rules of the FDER, Chapter 17-2, Florida Administrative Code. The revised Federal PSD regulations [(45 FR 154:52676-52748, August 7, 1980)] are not entirely applicable to this project since a complete PSD application (Environsphere 1980) was filed with USEPA

Table 2.5-2. Environmental assessment of cooling water intake alternatives for the SJRPP (JEA/FP&L 1981a).

Options	Advantages	Disadvantages
O-A Closed Cycle Cooling—Intake from NGS (Northside Generating Station) cooling water discharge canal during NGS operation	A-1 Eliminates impingement at the proposed plant's intake A-2 Of those organisms entrained, 30% to 100% will be already stressed beyond recovery from passage through NGS A-3 Construction impact on the aquatic environment limited to NGS discharge canal	
O-B Closed Cycle Cooling—Intake directly from St. Johns River		D-1 Construction impact on aquatic environment moved to Blount Island Channel D-2 Chance for impingement of aquatic organisms D-3 More viable organisms would be entrained

Table 2.5-3. Environmental assessment of cooling water discharge alternatives for the SJRPP (JEA/FP&L 1981a).

Options	Advantages	Disadvantages
O-A Closed Cycle Cooling—Discharge to NGS (Northside Generating Station) cooling water intake flume	A-1 Thermal, saline, and chemical discharges from SJRPP will be diluted by the NGS discharge, thereby reducing the potential impacts on aquatic biota and water quality of Blount Island Channel A-2 Construction impact on the aquatic ecosystem limited to NGS intake flume	D-1 Small increase in thermal attraction at Northside's discharge in Blount Island Channel
O-B Closed Cycle Cooling—Discharge to Blount Island Channel		D-1 Construction impact on aquatic ecosystem moved to Blount Island Channel D-2 Increased temperature, salinity, and chemical concentrations from blowdown will be discharged directly into the Blount Island Channel resulting in a greater potential impact on the aquatic ecosystem D-3 Greater potential for thermal attraction by placing an additional point of discharge in Blount Island Channel

before the new rules were promulgated. Alternative air quality control systems were evaluated for particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide, hydrocarbons, and fugitive dust.

2.5.2.1 Particulate Control

Both electrostatic precipitators (ESP) and fabric filters have been demonstrated to be effective in reducing particulate emissions from power plants to the 0.03 lb/MMBtu level required by NSPS. High energy scrubbers have been considered in some cases, but generally have not been found to be suitable by USEPA [(44 FR 113:33579-33624, 11 June 1979]. Therefore, only ESP and fabric filters were considered for particulate control at the SJRPP.

Energy, economic, and environmental comparisons were made among; (1) fabric filters at an emission level of 0.02 lb/MMBtu; (2) ESP at an emission level of 0.03 lb/MMBtu (the applicable NSPS); and (3) ESP at a lower emission level of 0.02 lb/MMBtu to match that provided by the filter (JEA/FP&L 1981a). These comparisons are summarized in Table 2.5-4. Fabric filters tend to require approximately the same amount of electric energy as ESP's, but the exhaust flue gas must be maintained at a higher temperature for proper operation. To maintain this temperature, additional fuel must be burned resulting in net higher energy requirements for fabric filters.

An economic comparison was made among the previously described alternatives using conservative design assumptions for both the ESP's and fabric filters (JEA/FP&L 1981a). While the ESP's tend to be higher in capital cost than fabric filters, this difference is compensated for by somewhat lower operation and maintenance costs. When combined with the filter replacement costs and the extra fuel costs required for operating filters, both ESP options appear to be less costly for particulate control than fabric filters.

Because of design factors, fabric filters for this application would be expected to produce one-third lower emissions than the ESP designed to meet the BACT limit of 0.03 lb/MMBtu. Regardless of the alternative selected, however, modeling done for the SJRPP PSD permit indicated that ambient air quality standards would not be exceeded, PSD increments would not be violated, and there would be no significant impact (less than 5 ug/m^3) on the Jacksonville non-attainment area (JEA/FP&L 1981a). Given the previous analyses, the fact that the use of fabric filters may not allow the flexibility of oil-firing the SJRPP boilers, if necessary, and the lack of experience in the application of fabric filters to power plants, an ESP designed to meet the BACT limit of 0.03 lb/MMBtu was selected.

2.5.2.2 Sulfur Dioxide Control

A large number of sulfur dioxide emission control technologies are currently in use or at various stages of development. These are generally classified in a three-level system according to whether the technology produces a solid waste or a saleable by-product; whether the process is operated in a wet, semi-wet, or dry mode; and, in the case of wet scrubbing technologies, whether the absorbent liquid is a slurry or a clear liquid. Initially, 23 sulfur dioxide control technologies were screened according to criteria of process

Table 2.5-4. Comparison of particulate control alternatives for the SJRPP (JEA/FP&L 1981a).

System/Control Level	Cost ($ x 1,000) Capital	Cost ($ x 1,000) Annual O&M	Cost ($ x 1,000) Equiv. Annual	Equivalent Energy Consumption (kw-yr)	Advantages	Disadvantages
1. Electrostatic Precipitator (0.03 lb/MMBtu)	174,121	24,631	221,701	5,462	1. Lowest cost 2. Energy consumption lower than for System 2 or 3	1. Higher emission levels, but ground level concentrations not significantly higher
2. Electrostatic Precipitator (0.02 lb/MMBtu)	184,031	25,964	233,699	5,707	1. One-third lower emission rate 2. Energy consumption lower than for System 3 3. Equivalent annual cost lower than System 3 by $688,000	1. Equivalent cost higher than System 1 by $11,998,000 2. Energy consumption higher than for System 1
3. Fabric Filter (0.02 lb/MMBtu)	143,859	28,929	260,387	9,798	1. One-third lower emission rate	1. Equivalent cost higher than System 1 by $38,086,000 and System 2 by $26,688,000 2. Energy consumption higher than for System 1 or 2 3. Might not allow oil-firing 4. Less extensive operating experience than for electrostatic precipitators

development status, process performance capabilities, and resource requirements (Table 2.5-5) (JEA/FP&L 1981a). An alternative process was generally considered to be acceptable from a development status standpoint if it were on order or in use for at least 2,500 MW's of electric utility generating capacity and if at least 100 MW's of this capacity were in operation by the end of 1980. The performance of each technology was judged by its ability to meet NSPS, feasibility of waste and by-product disposal, and the need for special fuels and reagents that might not be available over the life of the plant. As a result of this initial screening, the lime/limestone wet scrubbing technology and the lime spray dryer technology were selected for more detailed analysis.

Lime Spray Dryer

In the lime spray dryer system, hot flue gas comes directly from the boiler into a contacting chamber where an atomizer introduces an aqueous lime solution into the flue gas stream. The SO_2 is absorbed by the lime and the thermal energy of the flue gas evaporates the water carrier to produce a dry powder mixture of sulfites and sulfates with some residual unreacted lime. This dry waste product is removed from the flue gas downstream of the spray dryer along with the fly ash in a fabric filter. A regenerative variation of this process using sodium carbonate is also available.

Lime/Limestone Scrubber

Lime and limestone slurry scrubbing systems are the most prevalent FGD processes used for utility boilers in the United States. The lime/limestone wet scrubbing process uses a slurry of calcium oxide or calcium carbonate to absorb SO_2 in a wet scrubber. Some oxygen also is absorbed and causes oxidation of absorbed SO_2 and formation of calcium sulfate. The calcium sulfite and sulfate crystals are precipitated in a holding tank. If process conditions are controlled, as proposed for the SJRPP, the calcium sulfate can be of sufficiently high quality to be sold as commercial grade gypsum.

Comparison of FGD Processes

Energy, economic, and environmental comparisons were made among the lime/limestone scrubber system at both 90% and 95% removal efficiencies and a lime spray dryer system at a 90% removal efficiency (Table 2.5-6). The systems compared in this case were designed on the basis of a "worst case" coal (4% sulfur, 10,500 BTU/lb heating value) (JEA/FP&L 1981a).

Although it has not been as thoroughly tested and developed as the lime/limestone scrubber process, the lime spray dryer offers certain potential advantages. It requires less electric energy to operate and the flue gas does not have to be reheated to effect proper plume rise characteristics from the stacks. Also, with its integral particulate control system (assumed to be a fabric filter in this case) the overall capital cost for particulate and SO_2 control would be lower than the total control package for particulates and SO_2 using ESP's and lime/limestone wet slurry scrubbing. However, operating costs and the overall capitalized annual cost for this system would be higher. The

Table 2.3-5. Screening of sulfur dioxide emission control technologies (JEA/FP&L 1981a).

		Process	2,500 MW's in Operation and/or on Order	Existence of 3 or More Qualified Domestic Suppliers	Inherent Performance Capability	Waste Disposal/ By-product Acceptability	Special Fuels/ Reagents/ Reprocessing Facilities
Throw Away	Wet	Lime/Limestone					
		Alkaline Fly Ash					
		Limestone Boiler Injection	X	X	X		X
		Sea Water	X	X		X	
		Sodium Carbonate	X			X	
		Dual Alkali	X				
		Lime/Chloride	X	X			
		Dilute Acid	X	X			
		Semi-Dry Spray Dryer - Lime					
		- Sodium	X			X	
		Dry Nahcolite	X	X(?)	X	X	X
		Dry Furnace Injection - Calcium	X	X	X		
		- Sodium	X	X		X	
Recovery	Wet	Magnesia Slurry	X	X			X
		Steam Stripping	X	X			X(?)
		Wellman Lord Sodium Sulfite	X	X			
		Ammonia	X	X			X
		Buffer Solution (Citrate & Phosphate)	X	X			
		Semi-Dry Ammonia	X	X			X
		Semi-Dry Sodium Carbonate	X	X			
	Dry	Dry Carbon Sorption	X	X			X
		Copper Oxide	X	X			X
		Catalytic Oxidation	X	X			
		Molten Carbonate	X	X			

Note: "X" denotes unacceptability.

Table 2.5-6. Comparison of sulfur dioxide control alternatives for the SJRPP (JEA/FP&L 1981a).

System/Control Level	Cost ($ x 1000)			Equivalent Energy Consumption (kw-yr)	Advantages	Disadvantages
	Capital	Annual O&M	Equiv. Annual			
1. Lime/Limestone Scrubber (0.76 lb/MMBtu)	283,523	99,997	900,063	24,982	1. Energy consumption lower than System 2 2. Lowest equivalent cost	1. Energy consumption higher than System 3 2. Water consumption higher than System 3
2. Lime/Limestone Scrubber (0.4 lb/MMBtu)	286,267	102,954	926,679	26,047	1. Lowest emission rate 2. Equivalent cost lower than System 3 by $213,834,000	1. Highest energy consumption 2. Sludge generation higher 3. Equivalent cost higher than System 1 by $26,616,000 4. Higher water consumption than System 3
3. Lime Spray Dryer (0.76 lb/MMBtu)	415,487	151,342	1,362,214	15,106	1. Low energy consumption 2. No wet sludge handling 3. Low water usage	1. Cost higher than System 1 by $240,450,000 and System 2 by $213,834,000 2. Not as much operating experience as for lime/limestone scrubber 3. Will not allow production of a usable by-product (gypsum)

other advantages of the lime spray dryer process in this case are that it requires low water usage and that it produces a dry waste product.

The disadvantages of a sodium based throwaway spray dryer system focus upon the generally high operation cost, the high cost of the lime, and the lack of operating experience with this system. The first two problems would be mitigated somewhat by using the regenerative sodium alkali process variation, although process complexity and capital costs increase dramatically. Furthermore, the regeneration step using carbon has not been demonstrated at a full scale installation. For these reasons the lime dryer was rejected.

Lime/Limestone

The lime/limestone processes are favored by utilities because they use naturally occurring materials, and because their operating costs are not as high as for many other processes. In this case, the option also exists for production of the salable gypsum by-product.

The major advantages of limestone wet scrubbing systems over lime systems include a lower reactant cost and the general availability of limestone in the quantities required. Although a limestone system consumes more auxiliary electrical power than a lime system, it is less energy intensive overall since substantial fuel is required to produce lime. For these reasons a limestone wet scrubbing technology was selected over lime scrubbing.

If a limestone scrubber system were to be constructed to remove 95% of the SO_2, the resulting reduction in emissions would decrease increment consumption by nearly 50%. JEA contended that in either case, allowable PSD increments would not be exceeded (JEA/FP&L 1981a), however, FDER has modeled a violation of the short-term, 24-hour SO_2 State standard which may have been mitigated by the use of a more efficient scrubber. Resolution of this issue is still in negotiation. The net benefit from the increased removal efficiency would be a 20% reduction in maximum short-term concentrations of SO_2 in the immediate vicinity of the plant and a 5% reduction in average annual maximum concentrations.

Based on energy, economic, and environmental factors, a limestone wet scrubber system designed to meet the BACT emission level of 0.76 lb/MMBtu and to produce a markatable gypsum by-product was selected by JEA and FP&L for use at the SJRPP.

2.5.2.3 Alternative Controls for Other Emissions

Other emissions of concern include nitrogen oxide (NOx), carbon monoxide (CO), hydrocarbons (HC), and fugitive dust. The proposed BACT emission levels are 0.6 lb/MMBtu for NOx and CO will be determined during performance testing for compliance with NSPS. Emissions of NOx and CO are a function of boiler design and operating characteristics and are inversely related to each other. In practice, manufacturers optimize their designs in order to optimize the reduction of NOx and CO emissions. Because these levels are fixed by boiler design, no alternatives were examined.

Fugitive particulates will be generated by fuel handling, waste handling, and salt drift from the cooling towers. Control measures for these sources described in Section 2.2 included coal pile wetting, enclosed conveyors, fabric filters at transfer points, and mist eliminators on the cooling towers. These controls constitute BACT and no others were examined.

2.5.3 Water Systems Alternatives

During the design of the SJRPP, studies were conducted to minimize water use through reuse and recycle of water and wastewater to the greatest extent possible. The water requirements of the SJRPP were described in Section 2.2 and the water system alternatives for the condenser cooling system were described in Section 2.5.1. This section analyzes the other alternative water systems proposed for the SJRPP.

2.5.3.1 FGD System

The selected sulfur dioxide control system will require an average of 2,640 gpm (3,150 gpm maximum) for makeup. In order to be able to produce a commercial grade gypsum by-product as proposed, the makeup water must be of relatively high quality, containing a low dissolved solids concentration. Surface water from the St. Johns River and wastewater from the plant are high in dissolved solids and would require expensive treatment to be made suitable. Also, preliminary estimates indicate that chloride levels in the makeup water must be between 4,000 to 8,000 mg/l to avoid corrosion of sensitive components scrubber. Consequently, groundwater was found to be preferable as the source of FGD system makeup (JEA/FP&L 1981a). The use of surface water could be considered if noncommercial grade gypsum were to be produced.

2.5.3.2 Bottom Ash Handling

The proposed bottom ash sluicing system would require an average of 2,250 gpm of recirculating water and 200 gpm of makeup water (JEA/FP&L 1981b). Bottom ash would be dewatered in bins and the ash would be sold or disposed of dry. Surface water from the St. Johns River would not be suitable for makeup because of its high dissolved solids content. Fresh water is required for makeup to this system in order to prevent excessive corrosion and to avoid high chloride levels in the dry bottom ash. High levels of chloride in the bottom ash make it undesirable from a marketing standpoint and would reduce the chances for resource recovery (Moehle 1981b). The estimated 100 gpm of blowdown will be used for fly ash wetting to reduce fugitive dust.

2.5.3.3 Other Water Uses

Approximately 125 gpm of plant service water and 600,000 gallons of stored fire protection water will be needed. Groundwater will be used for plant service water due to the quality requirements for potable water and also for fire protection due to the need to prevent corrosion and scaling in the storage and distribution systems (JEA/FP&L 1981a). An average of 18 gpm of low quality water will be required for dust suppression on the coal piles. Due to the lack of specific water quality requirements, reclaimed water from sedimentation ponds will be used for coal dust suppression.

2.5.4 Wastewater Treatment Systems Alternatives

The SJRPP will be subject to the USEPA Effluent Guidelines and Standards for Steam Electric Power Generating, Standards of Performance for New Sources (40 CFR, Part 423.15, 8 October 1974, as amended) (Table 4.3-1) and State water quality standards set forth in Chapters 17-3 and 17-4, Florida Administrative Code (Table 3.3-1). The design objectives of the SJRPP wastewater treatment system are to comply with these effluent guidelines and standards, to optimize the use of the plant's water resources by minimizing plant water makeup and discharges, to maximize water reuse, and to minimize costs (JEA/FP&L 1981a).

The sources of wastewater from the SJRPP were described in Section 2.2. The principal wastewaters generated at the plant are plant process wastewater, sanitary wastewater, and cooling tower blowdown containing biocides.

2.5.4.1 Plant Process and Chemical Wastewater

Two alternative state-of-the-art approaches to treatment of plant process and chemical wastewater were considered: (1) treatment and partial reuse; and (2) complete treatment and reuse. The complete treatment and reuse option would require that the wastewater treatment facility be designed to soften (i.e., remove) calcium, magnesium, and silica in addition to removing other pollutants so that the wastewater can be reused as makeup for the bottom ash transport system and the condenser cooling system (JEA/FP&L 1981a). This option is possible, but the cost of constructing and operating such a system would be very high for the 1,291 gpm (1.86 million gallons per day) of wastewater generated on-site.

A partial recycle system was selected because it would provide substantial reuse of plant wastewater but at a lower cost (JEA/FP&L 1981a). In this case wastewater would be used where possible within the plant. The wastewater would be high in dissolved solids, however, and would be treated prior to discharge in order to reduce regulated pollutants to within standards. Both integrated and segregated systems were examined for this option. Segregated treatment would provide individual treatment facilities for each wastewater stream. Integrated treatment involves the use of one facility which is designed with sufficient flexibility to provide treatment for each waste stream according to its intended use, reuse, or discharge. The integrated system was chosen due to cost and operational considerations (JEA/FP&L 1981a).

2.5.4.2 Sanitary Wastewater

Both on-site treatment and discharge and transportation of sanitary wastewater to the City of Jacksonville municipal wastewater treatment system were considered. Transportation and treatment in the Jacksonville system was rejected due to the fact that it would be very expensive to build the five miles of connecting sewers necessary to reach the nearest manhole in the municipal system (JEA/FP&L 1981a). A relatively simple extended aeration type package wastewater treatment plant could be installed on-site. It would easily accommodate fluctuations in flow and yet provide very efficient, dependable treatment at a modest cost. Therefore, on-site treatment using a package wastewater treatment plant was selected for management of sanitary wastewater.

2.5.4.3 Biocide Treatment of Recirculating Cooling Water

Treatment of the recirculating cooling water is required to control biological fouling of the cooling towers and the associated piping and structures. An Amertap, nonchemical system is being considered to control fouling of the condenser. Three alternative biocide treatments were considered for control of fouling in the cooling towers: chlorination, bromochlorination, and ozonation.

Chlorination is the industry standard for control of biological fouling in cooling towers. Chlorine is an inexpensive and effective biocide. It can be added to the recirculating cooling water either as gaseous chlorine, solid calcium hypochlorite, or liquid sodium hypochlorite to form hypochlorous acid and hypochlorite ions which are the effective biocides. In order to control biological fouling, a sufficient concentration of residual chlorine biocides must be maintained in the system for a long enough period of time (typically 2 hours) to destroy microorganisms in the system. Chlorine residuals (TRC) in the form of free available chlorine and other residual oxidants remaining in the system are discharged in the system blowdown. The toxic effects of chlorine residuals (TRC) and other residual oxidants (TRO) on the aquatic environment are of concern and must be minimized by careful management of chlorine dosing.

The use of bromine chloride as a cooling system biocide is relatively new and is under study. The bromine chloride hydrolyzes in water to hypobromous acid (an effective biocide) and hydrochloric acid. This hydrolosis results in a lower level of residual chlorine and chloramines than does the hydrolosis of chlorine and thereby reduces the toxic effects of residual chlorine from the cooling system blowdown. In addition, although bromine chloride is more effective than chlorine as a biocide for microorganisms, it exhibits a lower toxicity effect on fish. The major drawback in the use of bromine chloride as a biocide is that it has not been demonstrated for use in cooling towers.

Ozone (O_3) is one of the most powerful biocides known. It is very effective and decomposes to oxygen after a short time in the water, thereby improving water quality. However, ozonation has several drawbacks including the need for expensive on-site production facilities (it cannot be stored), corrosiveness to iron alloys and slightly less effectiveness than chlorine on some biological slimes which foul cooling towers. There is no operating experience with ozone for this purpose and the capital and O&M costs are approximately twice those for an equivalent chlorination system (JEA/FP&L 1981a). Although ozonation or bromochlorination would be preferable from an environmental standpoint, chlorination was selected because of its proven effectiveness, cost, and proven operating experience (JEA/FP&L 1981a).

2.5.5 Solid Waste Management Alternatives

Solid waste including bottom ash, fly ash, and FGD sludge will be generated in large quantities by the power plant and emission control systems. If no market can be found for these materials, provisions will have to be made to dispose of them on-site. Alternative disposal plans were examined with the objective being to minimize leachate from the solid wastes into the groundwater and surface water.

2.5.5.1 Bottom Ash

Three bottom ash disposal alternatives were considered: (1) wet sluicing to a lined ash pond for disposal; (2) wet sluicing to dewatering bins and landfill disposal; and (3) mechanical ash removal with landfill disposal (JEA/FP&L 1981a). The first alternative, wet sluicing to a lined ash pond, is the industry standard. In this system, ash laden sluicing water is routed from the ash hoppers to the pond where the ash settles out and the water is recirculated back to the plant. The second alternative is similar except that the ash is separated from the sluicing water in bins and then trucked to a landfill for disposal. The third alternative accomplishes simultaneous ash removal and dewatering by means of a conveyor system. The ash is trucked from the conveyor discharge point to a landfill. This alternative requires less water and power than the other systems but is relatively new and untested in the United States. Because JEA and FP&L hope to be able to market the bottom ash, the second alternative involving direct dewatering of the ash was selected. This proven technology involves relatively small land requirements and allows for easy disposal of dry ash if it cannot be marketed (JEA/FP&L 1981b).

2.5.5.2 Fly Ash

Three fly ash disposal alteratives were considered: (1) wet sluicing to an ash pond for disposal; (2) pneumatic conveyance with on-site disposal; and (3) pneumatic conveyance with off-site disposal (JEA /FP&L 1981a). Since the fly ash will be collected dry in the ESP's and sold by the utilities if possible, it appears that the first alternative would create an unnecessary wastewater stream. Further, a complete recycle system would be required for the fly ash transport water because proposed USEPA regulations prohibit any discharge of TSS and oil and grease from the system. Because of dissolved solids buildup in the transport water and associated scaling problems, a complete recycle system would be expensive and difficult to operate.

The difference between the second and third alternatives is the disposal site. In both alternatives, the fly ash would be temporarily stored in silos at the plant. If it could not be sold, it would be disposed in a landfill. Because adequate land exists on-site to accommodate the expected quantity of fly ash, it would not be necessary to haul the fly ash off-site for disposal (JEA/FP&L 1981a). Therefore, the second alternative is preferred. Proposed disposal practices are discussed in the following section.

2.5.5.3 FGD Sludge

Three FGD sludge disposal alternatives were considered: (1) on-site disposal in ponds; (2) on-site disposal in a landfill; and (3) recovery and reuse (JEA/FP&L 1981a). Recovery and reuse of waste materials was one of the basic design goals of the SJRPP wherever possible and the selected FGD system was designed to produce a salable quality calcium sulfate (gypsum) by-product (Sections 2.5.2.2 and 2.5.3.1). Because of uncertainties regarding the actual marketability of the FGD sludge and the potential for temporary market interruptions, however, provisions for on-site storage will be necessary. In order to determine the best handling practices for fly ash and FGD sludge, the utilities propose a five-year test program (JEA/FP&L 1981a). All solid waste not associated with the test program will be landfilled in unlined landfill areas with monitoring wells to detect any leachate problems. Due to the unknown leachate characteristics of the fly ash and FGD sludge, the potential for contamination of the groundwater cannot be discounted.

2.5.6 Coal Handling Systems Alternatives

Coal handling systems are designed to remove coal from the rail or barge coal delivery system and convey it to the proper place on the site for use or storage. Other coal handling systems are used within the plant for reclaiming from active or inactive storage piles and to convey the coal to the in-plant silos. Design considerations include the mode of delivery, economics, fugitive dust control, coal characteristics, coal pile runoff, and dredge and fill restrictions for the barge unloading facility.

On-site storage facilities designed to accommodate a 120-day inactive coal reserve of 1.15 million tons and a three-day active coal reserve of approximately 39,000 tons will be required. Six primary options for rail-borne transport and handling of coal at the SJRPP site were considered as follows (JEA/FP&L 1981a):

Option Number	Unloading Method	Stackout Method	Reclaim Method
I	Rotary Dumper	Stacker-Reclaimer	Stacker-Reclaimer
II	Dump Pit	Stacker-Reclaimer	Stacker-Reclaimer
III	Rotary Dumper	Boom Stacker	Rotary Plow
IV	Dump Pit	Boom Stacker	Rotary Plow
V	Trestle	Trestle	Rotary Plow
VI	Trestle	Trestle	Stacker-Reclaimer

Since coal is also potentially available to the SJRPP site by barge, four secondary options involving coal barges and transporting the coal from Blount Island to the site were also considered as follows:

Option Number	Description of System
VII	Continuous bucket ladder barge unloader/overland conveyor to plant
VIII	Receiving bin for self-unloading barge or ship/overland conveyor to plant
IX	Barge/ship unloader/overland conveyor to plant
X	Barge/ship unloader/shuttle train to plant using existing tracks

It was assumed that all of the primary options for delivery of coal would be essentially the same from an environmental point of view and that cost and operability should be the distinguishing factor. For details on the cost, refer to Section 9.8.4 of the EID (JEA/FP&L 1981a). Based on the fact that roughly one quarter of the coal delivered to the site each year would be purchased on the spot market, there is uncertainty about the type and operability of all rail cars arriving at the site. Therefore, despite the estimate that Option II would be slightly less expensive, Option I with its rotary car dumper was selected for reasons of flexibility in handling all types of coal cars (JEA/FP&L 1981a). Also, because of cost and potential right-of-way problems associated with the conveyors in three of the four barge unloading facilities, Option X with its shuttle train delivery to the plant was selected (JEA/FP&L 1981a).

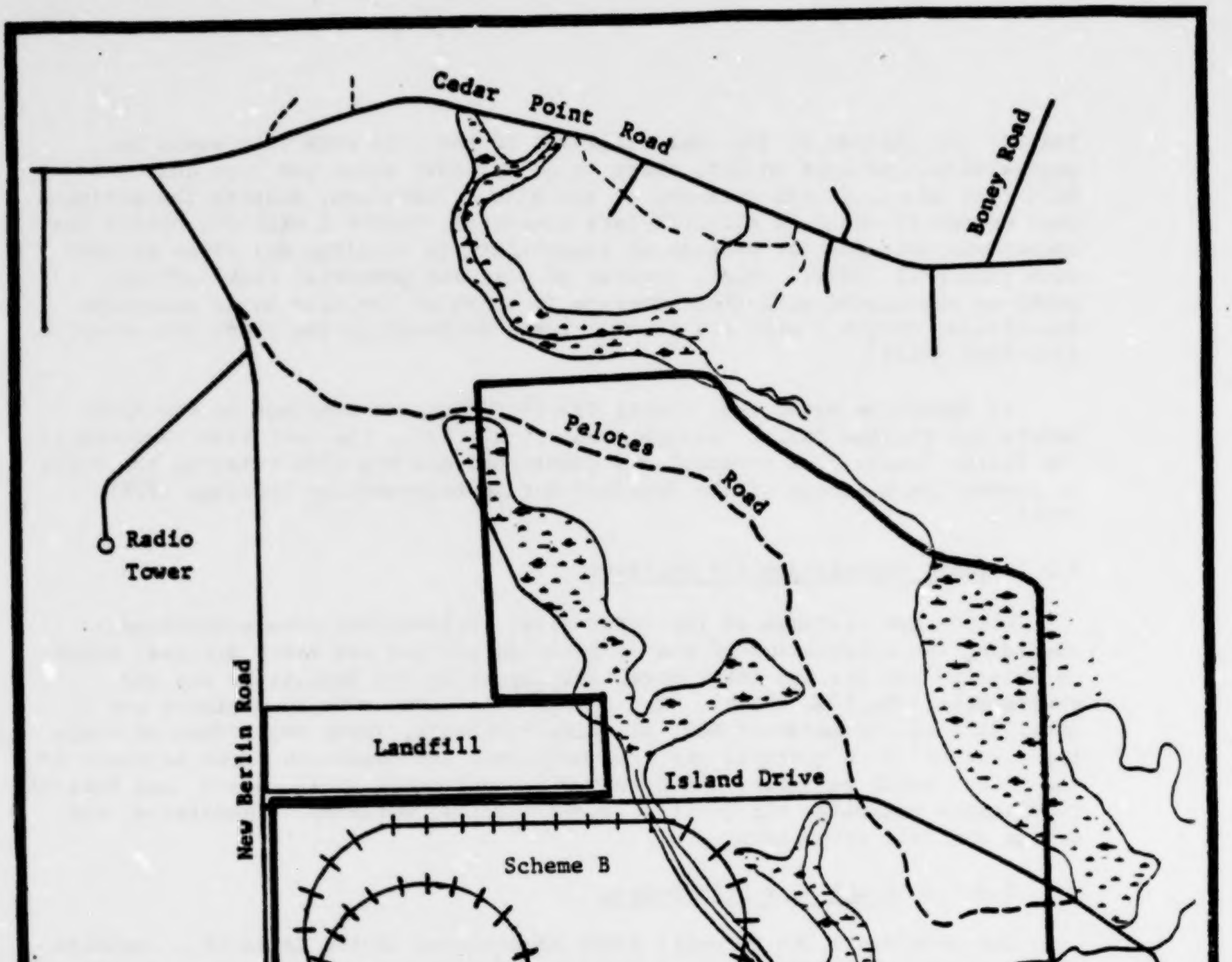
It should be noted that during the certification hearings on the SJRPP before the Florida Public Service Commission (FPSC), the cost effectiveness of the Blount Island coal terminal was questioned and the FPSC retained the right to review the prudency of the facility during rate-setting hearings (FPSC 1981).

2.5.7 Plant Orientation Alternatives

Within the confines of the SJRPP site, alternatives were considered regarding the orientation of the proposed facilities and waste disposal areas in order to realize the least potential impact on the facilities and the environment (JEA/FP&L 1981a). The design objectives were to maximize use of facilities at the adjacent NGS, minimize earthwork, avoid deposition of cooling tower drift on critical project components and sensitive areas adjacent to the plant, avoid wetlands, and comply with applicable local, State, and Federal regulations regarding air quality, water quality, wetlands, floodplains, and dredge and fill activities.

2.5.7.1 SJRPP Site Orientation

The proposed 1,200 MW power plant is designed on the basis of a standard plant concept which limits the flexibility for revision to the layout within the plant rail loop (JEA/FP&L 1981a). Therefore, the alternatives available for modification of the plant site are limited to the reorientation of the rail loop. The two major alternative orientations which were considered are depicted in Figure 2.5-1. Based on assessments of siting and environmental factors, Scheme A was the preferred alternative (JEA/FP&L 1981a). The primary reason for this selection was that the disruption of the small stream crossing the eastern end of the rail loop under Scheme B would constitute a greater impact on its associated wetlands than the destruction of the bayhead wetland in Scheme A. It appears that alternatives involving location of the rail loop above Island Drive would offer no improvement with respect to impacts on wetlands. Also, the need for large waste disposal areas on the site limits the number of orientations that may be considered. Due to the limitations of the site, it does not appear that the rail loop can be reoriented to avoid impacts on wetlands without acquiring more land further inland away from the sensitive wetlands. Acquisition of additional lands has been suggested as an alternative by the Florida Game and Fresh Water Fish Commission (Appendix H). JEA contends, however, that relocation of the rail loop to any other area near the present site would result in severe adverse effects on the schedule and cost of the project. It was estimated that additional engineering investigation and evaluation of the site would result in a 18-month delay in the schedule and that the cost of this delay would be approximately $115 million plus


Cedar Point Road
Boney Road
Radio Tower
Pelotes Road
New Berlin Road
Landfill
Island Drive
Scheme B
Faye Road
Scheme A
Seaboard Coast Line
SITE BOUNDARY
Browns Island
Seaboard Coast Line
0
1
MILES
0
1
KILOMETERS
N
Northside Power Plant

NOTE: Plant Area Within Rail Loop is 300 ± ac.

Figure 2.5-1. Alternative plant locations at the SJRPP (adapted from JEA/FP&L 1981a).

additional engineering costs (Moehle 1981d). In addition, the area described has been permitted for use as a municipal landfill for Jacksonville. If this site were used for the power plant, the City may have difficulty finding a suitable replacement site for the landfill.

2.5.7.2 Coal Barge Unloading Facility

Alternate locations were also considered for the ship coal unloading facility at the proposed site (JEA/FP&L 1981a). These include Dunn's Terminal, Dame Point, and Blount Island (Figure 2.5-2). Based on the reduced amount of dredging as compared to other sites, the proximity to approved spoil areas, and cost considerations (including estimates for land acquisition, construction, cost of railroad or conveyor, operation and maintenance), the Blount Island unloading option is the preferred alternative.

2.6 ALTERNATIVE MEANS OF SATISFYING THE NEED FOR THE PROJECT

2.6.1 Need for Analysis of Alternatives

The Florida Public Service Commission (FPSC) from its evaluation of the need for the proposed project (SJRPP) has determined that additional capacity for the purpose of ensuring adequate supplies of power would not be required in the proposed project's initial time frame (Appendix E). JEA and FP&L will require additional generating capacity for reliability purposes in 1991 and 1989, respectively. However, the main justification for SJRPP Units 1 and 2 to begin operation in December 1985 and May 1987, respectively, was to displace expensive oil-fired generation during the period between plant startup and the time that the additional power is needed, thus lowering the cost of power to the JEA and FP&L customers. The FPSC's subsequent determination and final order on SJRPP was based on the premise that ". . . the salient issue in the determination of need for SJRPP Units 1 and 2 with in-service dates of December 1985 and May 1987, respectively, is whether the construction of these units in the time frames proposed represents the lowest cost alternative available to the continued use of expensive oil-fired generation in peninsular Florida, and in the areas served by JEA and FP&L" (FPSC 1981b). The FPSC considered several alternatives to the continued use of oil to generate electricity. These included the proposed project; increased purchase of power from other non-oil-fired utilities; conversion of existing oil units to coal, coal-oil mix, or coal-water mix; purchase of a portion of Georgia Power's Plant Vogtle nuclear units; and additional conservation in excess of FEECA goals (Section 1.5). Based on the information and data provided at the Public Hearings of 22 and 23 May 1981, FPSC reached the final decision as quoted in Section 1.5.

The economic and environmental evaluation of alternatives to the SJRPP was identified at the public scoping meeting as a major issue for consideration in the SAR/EIS. In addition, USEPA is required by the regulations of NEPA to identify and assess reasonable alternatives to the proposed action that could potentially avoid or minimize adverse effects on the quality of the human environment. In this case, alternatives for consideration should meet the need for the project identified by the FPSC. Although a variety of oil displacement technologies were considered and subsequently eliminated by the FPSC when compared individually to the SJRPP, it is possible that combinations

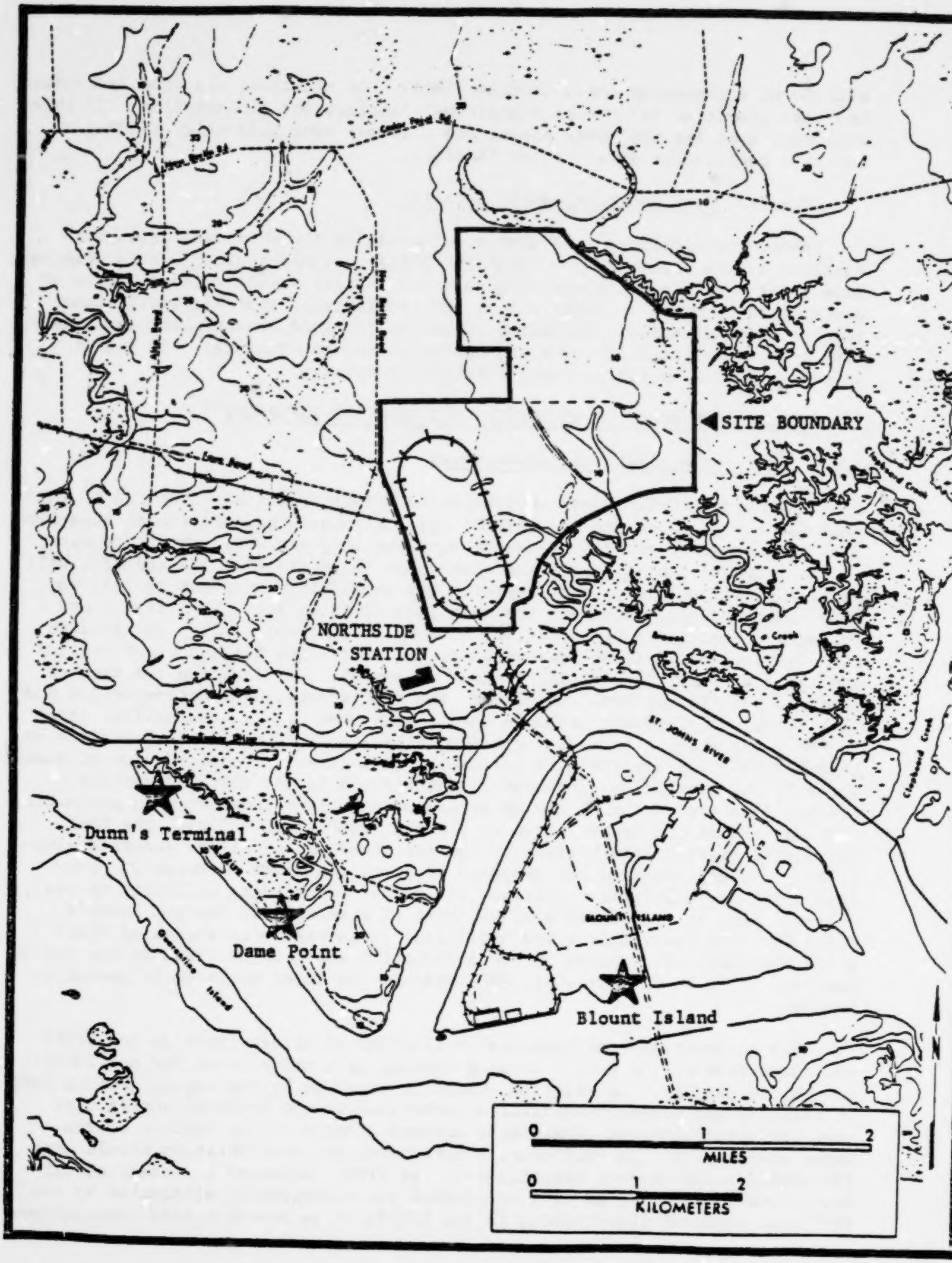

SITE BOUNDARY
NORTHSIDE STATION
ST. JOHNS RIVER
Dunn's Terminal
Dame Point
BLOUNT ISLAND
Blount Island
Clapboard Creek
0
1
2
MILES
0
1
2
KILOMETERS
N

Figure 2.5-2. Alternate coal unloading facility locations (JEA/FP&L 1981a).

of several technologies could provide a cost-effective means of displacing costly oil-fired generating capacity with less adverse environmental impacts than the proposed project. Based on this an investigation of alternatives to the proposed SJRPP was undertaken for the SAR/EIS.

The purpose of the EIS alternatives analysis is to consider the potential options including those identified by the FPSC to the continued use of oil and also to consider other feasible alternatives which would meet the primary objective of the project, i.e., the displacement of oil-fired generating capacity with a less expensive supply of electricity to JEA and FP&L customers. The economic and environmental ramifications of these alternatives were examined. In recognizing the importance of also providing an adequate, reliable source of electric power to meet future demands, evaluation of other alternatives which would provide near-term economic relief by displacing oil-fired generation does not preclude construction of SJRPP or other generating facilities when needed to provide additional capacity and displace additional oil-generating capacity. Thus the alternatives considered in the EIS which would meet the near-term objective of displacing oil and lowering electric rates could also complement the long-term objective of providing adequate power supply.

2.6.2 Available Technologies for Oil Displacement

In order to develop alternatives, the technologies appropriate for use in Florida during the current time frame had to be identified. The identification of these technologies was accomplished by feasibility screening. A more detailed discussion of the screening process and the power technologies considered is included in Appendix AA.

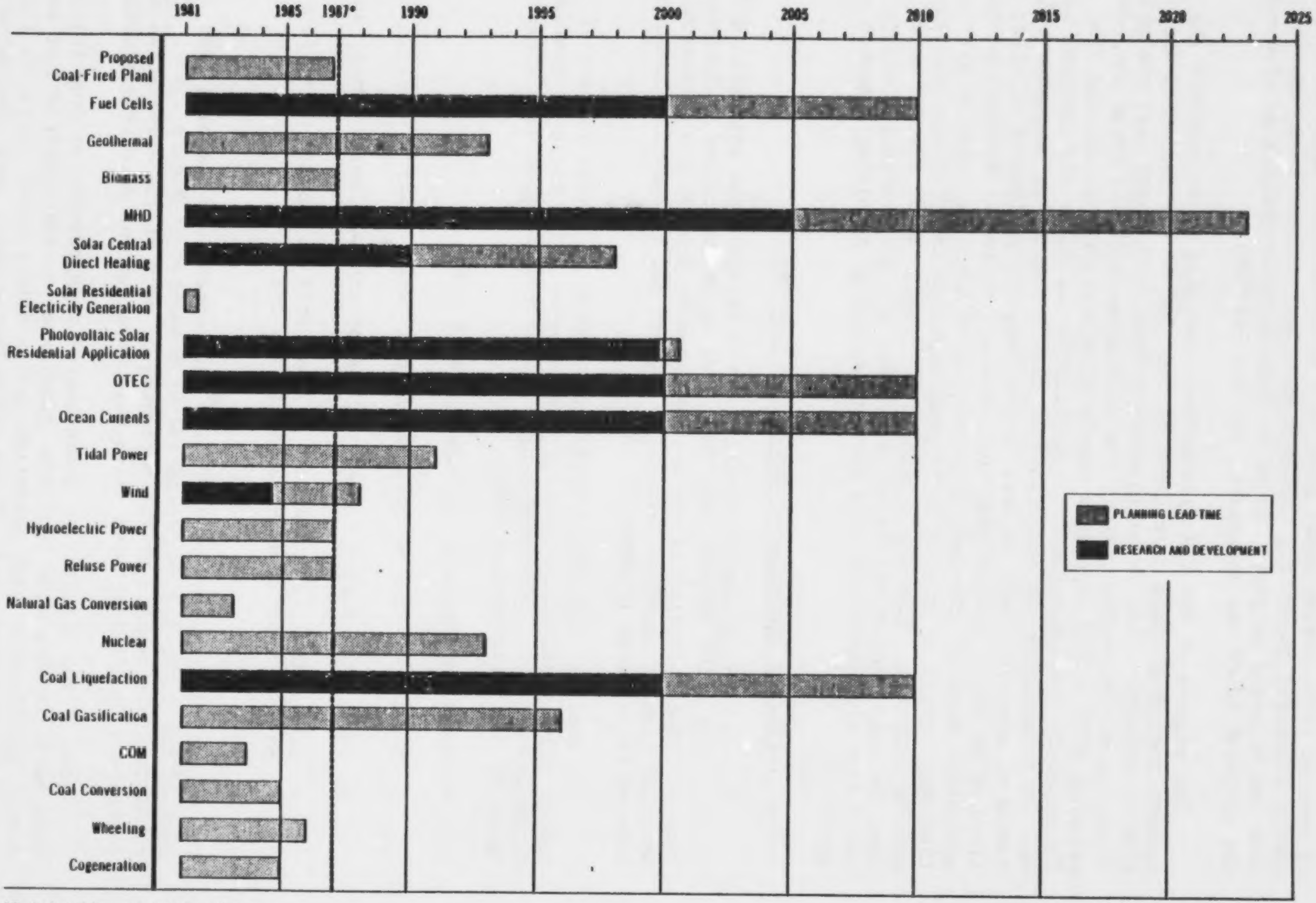
The analysis included a systematic review of a wide variety of conventional and nonconventional energy technologies which could be considered as alternatives to oil-generated power. These technologies were screened on the basis of the following criteria:

- Technology must be implementable by 1987;
- Technology must be technically and commercially proven;
- Technology should reduce the use of oil as a boiler fuel; and
- Needed fuel resource must be available in Florida or a transportation network must exist to bring in the fuel.

The current estimate of research and development and planning lead time for each of the technologies considered is presented in Figure 2.6-1. Table 2.6-1 summarizes the results of the screening of each of the alternative technologies and identifies those which were selected for further evaluation.

Many of the alternative technologies were eliminated from further consideration based on extensive lead time requirements, regulatory and/or environmental constraints, high operation and/or construction costs, or the unproven nature of the technology. Those technologies which were considered as viable

Figure 2.6-1. Time required for implementation of various energy technologies.



* Denotes Limit of Commercially Viable Energy Alternatives

Table 2.6-1. Summary of technology screening process used to identify alternatives to the proposed SJRPP project.

	Lead Time Requirements	Regulatory[2] Constraints	Technological[2] Constraints	Resource[2] Constraints	Cost Requirements	Environmental[2] Constraints	Viable Alternative to SJRPP
Nuclear	Long	-	-	-	High Capital	-	No
Coal Gasification	Long	-	-	-	High	-	No
Coal Liquefaction	Long	-	X	-	High	-	No
Natural Gas	-	X	-	-	Increasing[1]	-	No
Refuse Power	-	-	-	-	-	-	Yes
Solar Hot Water	-	-	-	-	-	-	Yes
Solar Central Power	Long	-	X	-	High	-	No
Photovoltaic Conversion	Long	-	X	-	High	-	No
Ocean Thermal Conversion	Long	-	X	-	High	-	No
Wind Power	Moderate	-	-	X	-	-	No
Hydroelectric Power	-	-	-	X	High	X	No
Biomass Power (Wood)	-	-	-	X	-	-	No
Geothermal	Moderate	-	-	X	-	-	No
Magneto Hydrodynamic Power	Long	-	X	-	-	-	No
Fuel Cells	Long	-	X	-	-	-	No
Tidal Power	Moderate	-	-	X	-	X	No
Ocean Currents	Long	-	X	-	-	-	No
Coal/Oil Mixture Conversion	-	-	-	-	-	-	Yes
Coal Conversion	-	-	-	-	-	-	Yes
Purchase of Power	-	-	-	-	-	-	Yes
Cogeneration	-	Yes	Reliability	-	High	-	No

---

[1] Although natural gas is currently low in cost, its cost is expected to increase dramatically after deregulation. Also, there is no additional pipeline capacity in Florida and no expansion of capacity is being planned.

[2] "X" indicates the presence of a significant constraint.

alternatives to SJRPP were not subject to these regulatory, environmental, or technological constraints; were relatively cost-effective; and could be brought on-line within the required time frame.

In summary, the technologies which met the screening criteria and were retained for further evaluation as alternatives to oil-fired power operation included the following:

- generation of electricity from refuse (refuse-fired power plant);
- conversion of existing oil-fired boilers to burn coal or a coal-oil mixture;
- reduction in electrical demand by installing residential solar hot water heaters;
- construction of a small coal-fired power plant; and
- purchase of power.

2.6.3 Development of Alternatives

Based on the previous analysis of technologies for displacement of oil-fired electric power generation and the analysis of alternatives conducted by the FPSC during the need hearing on the SJRPP, it was concluded that a number of alternative power systems could be developed which could satisfy the oil displacement goals of the utilities and their customers. The viable technologies were combined to form several alternatives which would match the oil displacement achieved by the SJRPP. These alternatives could not be developed to the level of detail provided by JEA and FP&L for the proposed project, but they were developed to a level of detail sufficient to determine the basic engineering and economic factors required to make a meaningful comparison of their relative environmental impacts. A detailed discussion of the development of alternatives for consideration in the EIS is presented in Appendix AA and detailed discussions of the economic and engineering analyses of the selected alternatives may be found in Appendices BB and CC, respectively.

2.6.3.1 Criteria for Alternatives Development

The feasible technologies were combined into alternatives which met the following criteria:

- the alternative would replace or save oil equivalent to or greater than the oil saved by the proposed project;
- the alternative must replace an amount of oil for each utility (JEA and FP&L) equivalent to the oil displaced by the proposed coal-fired power plant;
- the alternative must not result in any loss of capacity to either utility; and

- the alternative must be implementable within the proposed time frame of the SJRPP project (1987).

Large-scale technologies such as coal conversion were tied to specific units within each utility system being considered. In this way, the environmental impacts of the alternatives could be evaluated for a particular site. Small-scale technologies (i.e., installation of residential solar hot water heaters) could not reasonably be tied to a particular site or even a particular area within the service area of each utility because their application would be so widely dispersed. Therefore, assessment of the alternatives involving small-scale alternatives was treated generally.

The feasible technologies available for FP&L include conversion of Sanford Units 4 and 5 to burn coal, purchase of a share of Georgia Power's Vogtle Nuclear Power Plant, installation of solar hot water heaters, and construction of refuse-fired power plants. For JEA, feasible technologies include coal conversion, coal-oil conversion, residential solar hot water heaters, refuse-fired power, purchase of a share of Plant Vogtle, and construction of a new small coal-fired power plant. These feasible technologies were combined into four different alternatives. This SAR/EIS examines these four alternatives, the proposed action (Section 2.2), and the No Action Alternative.

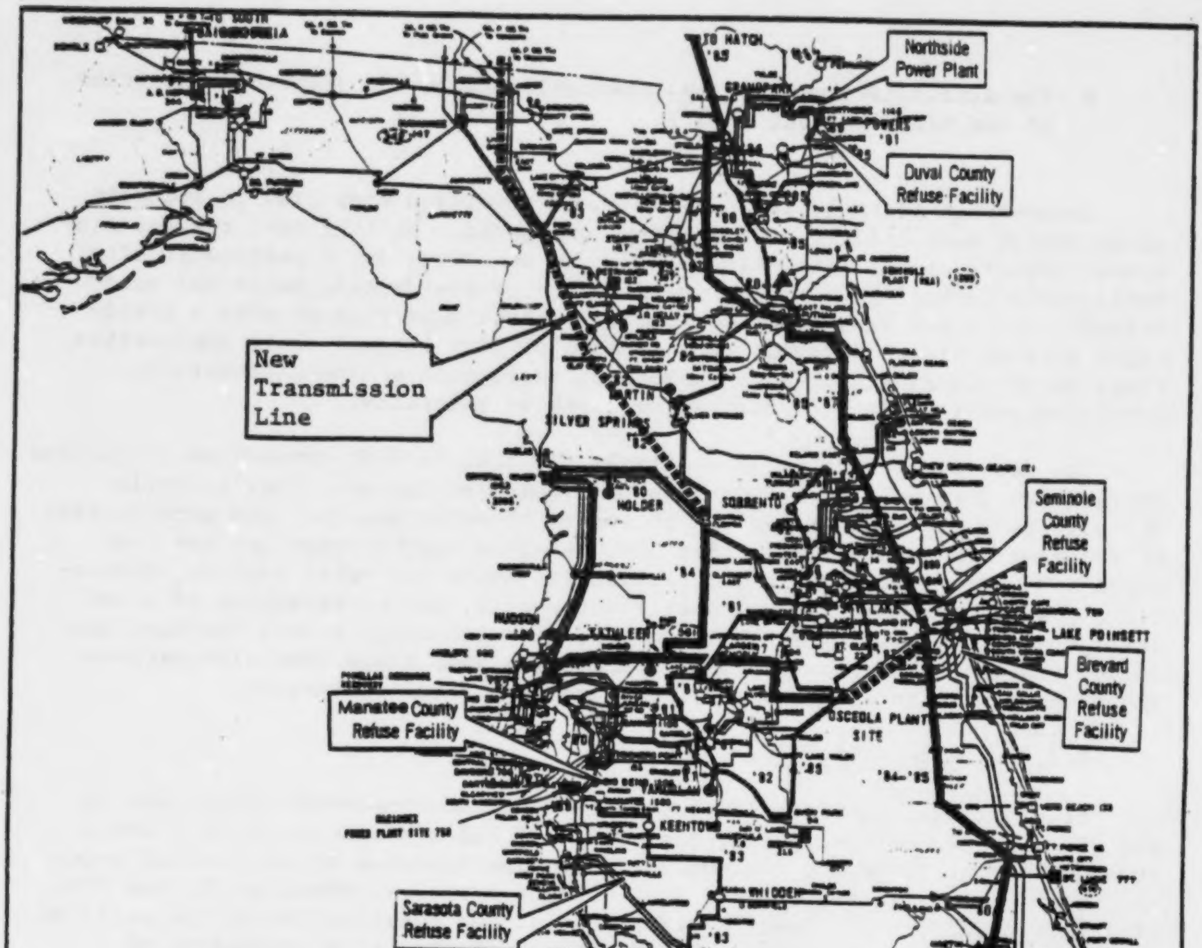
2.6.3.2 Alternative 1

Alternative 1 consists of construction of refuse-powered facilities in the JEA and FP&L service areas, conversion of JEA's Northside Units 1 and 3 from oil firing to burn a coal-oil mixture, installation of residential solar hot water heaters in the JEA and FP&L service areas, purchase by JEA and FP&L of a portion of Georgia Power's Plant Vogtle, and construction of 150 miles of transmission lines. The geographic locations of the major components of Alternative 1 are indicated in Figure 2.6-2 and its major power sources and oil displacement characteristics are summarized in Table 2.6-2. Alternative 1 would result in oil savings of 5.4 million barrels per year by FP&L and 5.9 million barrels per year by JEA. It would also increase the capacity of the FP&L system by 550 MW and the JEA system by 228 MW.

Residential Solar Hot Water Heaters

Under this alternative, it is assumed that FP&L and JEA would sponsor the retrofitting of solar water heaters for 25% of all new and 10% of all existing residential customers in their respective service areas. In case of a retrofit unit, the utility is assumed to pay for the manufacture and installation of the flat-plate collector, the additional piping, the pump, and the storage tank. New units would be very similar, although the additional storage tank is not absolutely necessary.

By 1988, this program would result in the installation of 23,817 solar water heating units in the JEA service area and 338,734 units in the FP&L service area. The construction of the solar units is assumed to occur evenly throughout a six-year period (1982-1987) and would require JEA to build about 3,970 units/year and FP&L to build about 56,456 units/year. Each solar water heater unit is expected to replace the use of approximately 2,100 kwh of


Northside Power Plant
Duval County Refuse Facility
New Transmission Line
Seminole County Refuse Facility
Brevard County Refuse Facility
Manatee County Refuse Facility
Sarasota County Refuse Facility
SILVER SPRINGS
HOLDER
SORRENTO
KATHLEEN
HUDSON
OSCEOLA PLANT SITE
LAKE POINSETT
KEENTOWN
WHIDDEN
CORBETT
1980 TEN-YEAR PLAN STATE OF FLORIDA
LEGEND
PLANNED FACILITIES
PRESENT SITES
NEW SITES
TRANSMISSION LINES
FUTURE
1980-1989
STATE OF FLORIDA ELECTRIC SYSTEM MAP
PREPARED BY FLORIDA COORDINATING GROUP

SITES FOR ALTERNATIVE #1

1. Refuse-Powered Facilities: JEA and FPL
2. Conversion of Northside Units #1 and #3 to Burn a Coal-Oil Mixture (JEA)
3. Purchased Power from Vogtle Nuclear (JEA & FPL)
4. Residential Solar Power (not sited) (JEA & FPL)

Figure 2.6-2. Geographic location of major components of Alternative 1.

Table 2.6-2. Summary of power sources and oil displacement for Alternative 1.*

	Capacity		Barrels of Oil Displaced/yr
Source of Power	(MW)	kwh/yr x 10^6	(x 10^3 barrels)
FP&L			
Residential Solar	116.0	711.3	1,147
Seminole County Refuse	9.5	58.2	94
Manatee County Refuse	11.9	73.0	118
Sarasota County Refuse	14.6	89.5	144
Brevard County Refuse	22.3	136.7	221
Purchased Power[1,2]	376.0	2,303.8	3,716
Total	550.3	3,372.6	5,440
Net increase in capacity of 550 MW			
JEA			
Residential Solar	8.2	50.0	87
Duval County Refuse	56.2	344.6	600
Coal-oil Mixture (Northside #1 & #3)	178.0	1,091.5	1,901
Purchased Power[1,2]	307.6	1,886.5	3,287
Total	550.0	3,372.6	5,875
Net increase in capacity - 228.4 MW			

---

*For assumptions and details of the power generation data, see Appendix CC.

[1] This alternative includes construction of new transmission lines as follows:
Tifton, Georgia to Ft. White (50 miles)
Ft. White to the Central Florida substation (100 miles)

[2] Figures indicated are net purchases. Actual amount purchased is 3% higher to account for transmission losses.

electricity per year. This replacement would save FP&L approximately 1.1 million barrels of oil per year and JEA approximately 0.087 million barrels per year. The solar water heaters would displace oil-fired generating capacity on both systems, would generate no pollutants, and would reduce water requirements, air emissions, wastewater discharges, and solid waste generation from the JEA and FP&L power generation systems as well. In addition, the implementation of the solar water heater program would entail a great deal of labor in the manufacture and installation of these units. JEA's solar program would create jobs for about 81 persons and FP&L's program would increase employment by about 1,148 for each year of the program.

The use of these units, however, would require provisions for backup power in case weather conditions rendered them ineffective for an extended period of time. These backup systems would still have to provide peak capacity sufficient to meet demand.

Refuse-fired Power Plants

Four counties in FP&L's service area and Duval County in the JEA service area are potential sites for refuse recovery electrical generation systems. These sites do not include the existing Dade and Broward Counties systems already in existence. The four counties in the FP&L service area could generate a total of 58.3 MW of electricity which would result in oil savings of 0.58 million barrels per year (Moreau 1981) while Duval County could generate 56.2 MW of electricity and replace about 0.6 million barrels of oil per year. The annual refuse and electricity generated by each county is as follows:

County	Refuse Generated (tons)	Electricity Generated (MW)	Oil Displaced (millions of barrels).
Seminole	117,000	9.5	0.095
Sarasota	180,000	14.6	0.145
Brevard	276,000	22.3	0.222
Manatee	146,250	11.9	0.118
Duval	693,000	56.2	0.600

For the FP&L locations, it is assumed that the refuse-fired generating facilities would be located near one of the county landfills, but no specific locations are implied. The resource recovery facility in Duval County could be located next to the North Sanitary Landfill adjacent to the SJRPP.

Refuse generating facilities would require land for the plant and ash disposal as well as water for cooling, boiler feedwater, and washwater. The facilities would generate air emissions, wastewater, and solid waste. The land required for the power plants would be for the truck unloading facility, refuse storage pits, boiler and turbine, stack, electrostatic precipitator (ESP), switchyard, administration building, and miscellaneous facilities such as employee parking. The bottom ash and fly ash removed by the ESP would be landfilled. The total land requirement, however, would be less than the land required to landfill the refuse. Thus, use of these facilities would result in a net land saving.

No attempt has been made to identify site-specific factors for refuse-fired plants (e.g., potential cooling water sources) because of uncertainties regarding their actual location. Consequently, these plants are addressed on a generic basis only. All of the refuse facilities are assumed, however, to use mechanical-draft cooling towers. The four facilities within the FP&L service area are also assumed to use fresh water and the Duval County facility would use saline water for cooling. The effluents from the units would be cooling tower blowdown, water treatment wastewater, boiler blowdown, and runoff from the refuse storage and ash landfill. Refuse-power generation would displace oil-fired generation and thus reduce water requirements, air emissions, and wastewater and solid waste generation in comparison to oil-fired power plants (Table 2.6-3).

Conversion to Coal-Oil Mixture

Because the JEA system is rather small and has a limited potential for development of solar and refuse power, other non-oil-fired power sources would be required to equal the oil-fired power displacement provided by the SJRPP. A portion of this non-oil-fired power would be purchased and the rest provided by converting one of JEA's existing plants to burn an alternate fuel. JEA's Northside Units 1 and 3 (Figure 2.6-3) are currently under study for conversion to burn a coal-oil mixture (COM) and are considered the most likely candidates in the JEA system.

The conversion of existing oil-fired boilers to COM combustion would include installation of new burners, modifications to the furnace bottoms to handle the increased amount of bottom ash, addition of retractable sootblowers to the furnace and convective section, and the addition of an electrostatic precipitator to control particulate emissions. Major modifications of the superheater, reheater, and economizer section are not expected to be required. Conversion would also require about 6.3 million barrels per year of coal-oil mixture estimated to be about 40% coal and 60% oil by weight. For this analysis it was assumed that the COM would be purchased from independent suppliers. Two private COM ventures are currently planned to be located on Blount Island close to the NGS and could produce the required quantity of COM. The COM would be trucked or pumped by pipeline from Blount Island to storage tanks located at the NGS. Because this fuel would have a lower heat output than that of 100% oil, the conversion of Northside Units 1 and 3 is estimated to result in a 20% derating of the units. This derating would result in the loss of 152 MW of generating capacity at the NGS which would be replaced by purchased power.

The conversion will require land for COM storage, ash ponds, ash landfill, and electrostatic precipitators. Land requirements plus changes in waste generation are summarized in Table 2.6-3. Due to derating of the units, the water requirement for the boiler makeup and cooling system would decrease. Similarly all wastewater discharges except the bottom ash wastewater blowdown will decrease. Bottom ash and fly ash generated at the NGS would increase after conversion due to the use of coal. A wet sluicing system would be used to remove the bottom ash. The ash would be settled in a lined pond and 95% of the supernatent would be recycled back to the ash sluicing system and 5% of it would be treated and discharged to the existing percolation pond. The fly ash

Table 2.6-3. Summary of land and water requirements, air emissions, and wastewater and solid waste generation for refuse-fired power plants and the COM conversion of NGS Units 1 and 3.

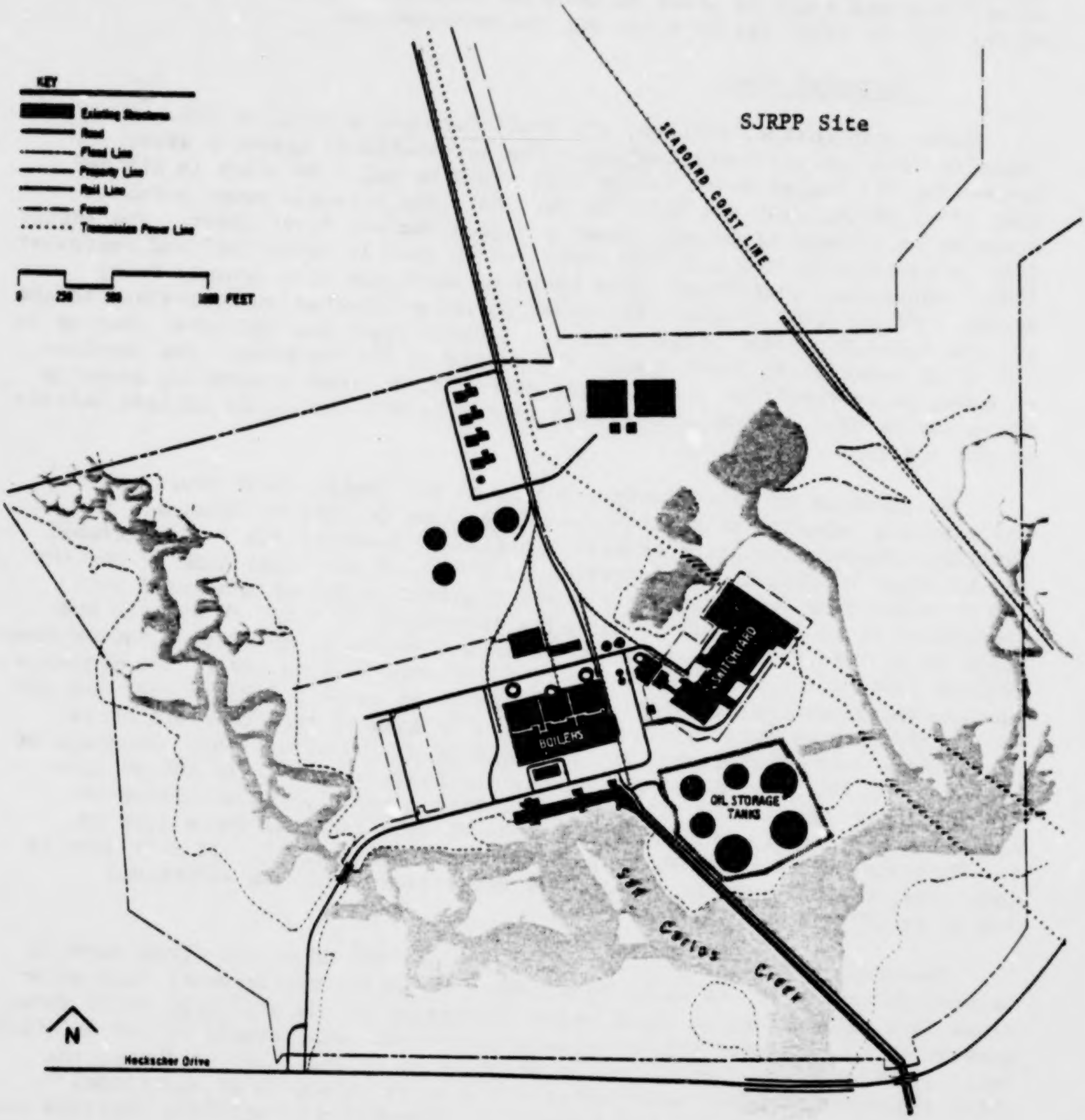
Power Megawatts	Seminole County 9.5	Brevard County 22.2	Manatee County 11.9	Sarasota County 14.6	Duval County 56.2	NGS COM 871[2]
Land Requirements, acres						
Ash Landfill	4.7	11.1	5.9	7.2	28.0	+38.7[2]
Plant	2.3	5.4	2.9	3.5	13.5	+6.7[2]
Total	7.0	16.5	8.8	10.7	14.5	+45.4[2]
Water Requirement, gpm						
Surface	83.0	194.0	103.0	126.0	1,840.0	-55,750[2]
Groundwater	0	0	0	0	7.0	-68[2]
Wastewater, gpm						
Cooling Tower Blowdown	8.0	19.0	10.0	12.0	1,262.0	-55,750[2]
Wastewater Treatment	1.6	3.7	2.0	2.4	0	-
Boiler Blowdown	1.1	2.7	1.4	1.8	6.7	-56.5[2]
Fireside Washwater	0.02	0.04	0.02	0.03	0.11	-
Demineralizer Water	0.03	0.07	0.04	0.04	0.17	-10.5[2]
Bottom Ash Sluicing	-	-	-	-	-	+15.3[2]
Heat Discharge to, Surface Water Btu/min (x 10^3)	1.6	3.6	1.9	2.3	242.2	-9,760.7[2]
Solid Waste, tpy (x 10^3)						
Bottom Ash	12.3	28.9	15.4	18.9	72.8	+8,021[2]
Fly Ash	1.7	4.0	2.1	2.6	10.1	+32,082[2]
Air Emissions, tpy						
Particulates	57.0	134.0	72.0	88.0	338.0	1,708
SO_2	147.0	344.0	183.0	224.0	867.0	33,807
CO	2,052.0	4,823.0	2,559.0	3,143.0	12,136.0	9,392
HC	87.0	207.0	110.0	135.0	520.0	581
NO_x	176.0	413.0	219.0	269.0	1,040.0	116
HCl	252.0	592.0	316.0	388.0	1,493.0	-

Note: For assumptions and details, see Appendix CC.

[1] Total output of NGS after conversion of Units #1 and #3 with 20% derating. Based on heat content of coal, the net non oil-fired power output would be 178 MW.

[2] Indicates net increase or decrease from existing NGS operating conditions.

Figure 2.6-3. Existing Northside Generating Station site plan.


KEY
Existing Structures
Road
Flood Line
Property Line
Rail Line
Fence
Transmission Power Line
0
250
500
1000 FEET
SJRPP Site
SEABOARD COAST LINE
SWITCHYARD
BOILERS
OIL STORAGE TANKS
San Carlos Creek
N
Heckscher Drive

would be collected dry and landfilled in a lined disposal area. Presented in Figure 2.6-4 is an illustration of changes in the NGS site which would potentially be made in order to convert Units 1 and 3 to burn COM. Note that the layout is intended only to illustrate the facilities required for COM conversion and the approximate land area required for the facilities. The actual layout of the NGS after COM conversion could be very different from that illustrated and would be based on detailed studies of the actual suitability of the site or other nearby sites for the proposed use.

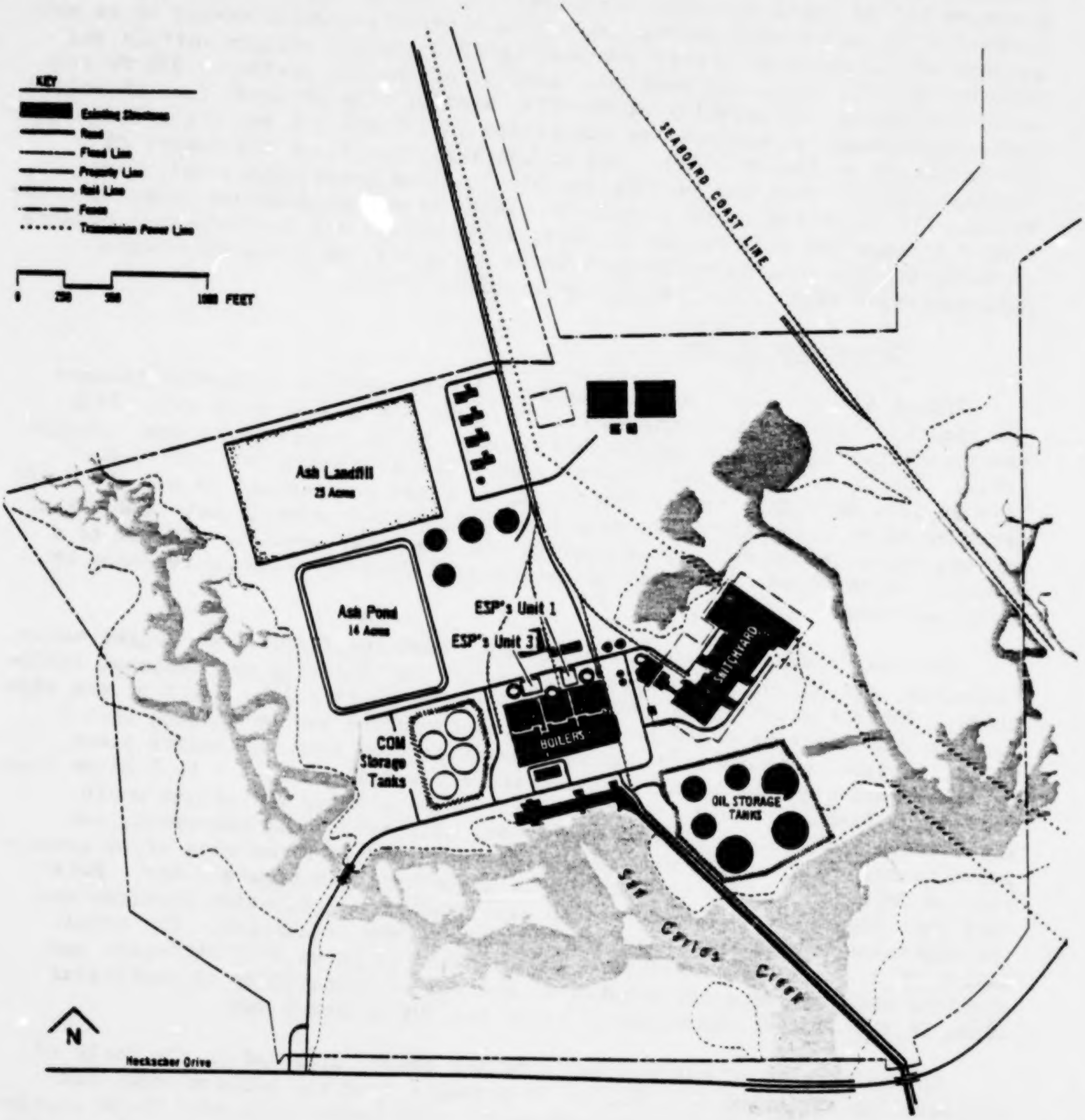
Purchased Power

Under this option, FP&L and JEA would purchase a total of 704.4 MW of capacity from Georgia Power Company. The net available capacity after accounting for transmission losses (3%) would be 683.3 MW which is divided into 375.7 MW for FP&L and 307.6 MW for JEA. The proposed power purchase would be as a share of Georgia Power's Vogtle Nuclear Power Plant. The Vogtle Station consists of two 1,150 MW units due on line in March 1987 and September 1988. Additional coal-fired power could be purchased from Georgia Power during 1986 and 1987 to make this power purchase alternative equivalent to the on-line dates for SJRPP Units 1 and 2. Georgia Power has indicated that up to 705 MW of capacity in Plant Vogtle are available for purchase. The purchase of power would result in displacement of oil-fired power generating capacity and a saving of 3,716 million barrels of oil by FP&L and 3,287 million barrels by JEA per year.

The purchase of approximately 705 MW of the Vogtle Plant would exceed the existing capacity of transmission lines from Georgia to Florida. The existing transmission lines between Georgia and Florida, the two additional 500 kV lines scheduled for completion in 1982, and the final link of the two 500 kV lines from Duval to Poinsett and Poinsett to Midway scheduled for completion in 1987 will have a transfer capability of 1,500 MW by 1983 and 2,000 MW by 1988. The transmission lines are scheduled to carry 1,500 MW from 1983 to 1986, 1,150 MW in 1987, and 1,400 MW from 1988 to 1991. The probable unallocated transmission capability is estimated to be 350 MW in 1987 and 600 MW in 1988 through 1991, although it could be less if two other utilities renew their current contracts for purchase of 250 MW after 1986. Purchase of the proposed 705 MW would thus require construction of a third 500 kV line. Florida Power Corporation (FPC) is soliciting other Florida utilities to assist in the construction of another 500 kV line from the State line to Ft. White in 1985 and Ft. White to central Florida in 1987. If this line is completed, the transmission capability would increase by an additional 500 MW in 1986 and 1,000 MW in 1988.

The proposed power purchase would displace 683 MW of oil-fired capacity between JEA and FP&L and would thus reduce the water requirements, air emissions, and wastewater and solid waste generation of the oil-fired units whose generation is reduced. The area-specific decrease will depend on the oil-fired units at which the reduction in operation occurs. The construction of the third transmission line, which extends 150 miles, would be an additional impact of this project and would result in disruption of wildlife habitats and land use changes due to construction.

Figure 2.6-4. Potential Northside Generating Station site plan with COM conversion.


KEY
Existing Structures
Road
Flood Line
Property Line
Rail Line
Fence
Transmission Power Line
0
250
500
1000 FEET
SEABOARD COAST LINE
Ash Landfill
25 Acres
Ash Pond
14 Acres
ESP's Unit 1
ESP's Unit 3
SWITCHYARD
BOILERS
COM
Storage
Tanks
OIL STORAGE
TANKS
San Carlos Creek
N
Heckscher Drive

2.6.3.3 Alternative 2

Alternative 2 consists of converting of FP&L's Sanford Units 4 and 5 from burning oil to coal, power purchase by JEA and FP&L from Georgia Power Company, and construction of 150 miles of transmission lines. JEA would purchase 550 MW (net) and FP&L 73 MW (net) to make up for the derating of the Sanford Plant after coal conversion. This alternative would result in an oil savings of 7.2 million barrels per year by FP&L and 5.9 million barrels per year by JEA. It would increase the capacity of the JEA system by 550 MW and would not change the capacity of the FP&L system. The proposed facilities and their associated oil savings are summarized in Table 2.6-4 and their locations are indicated in Figure 2.6-5. Due to uncertainties about the degree of emission control that may be required of oil-fired power plants which are voluntarily converted to burn coal, two cases have been examined under Alternative 2 to show the differences in cost, engineering, and environmental effects of designing the coal-fired Sanford Units 4 and 5 to meet the FDER State Implementation Plan (SIP) limitations or USEPA's NSPS.

Conversion to Coal

FP&L's Sanford Units 4 and 5 (Figure 2.6-6) would be converted to burn coal instead of oil while Sanford Unit 3 would continue to burn oil. FP&L has identified these units as the most likely to be converted to coal (Moehle 1981c). It is estimated that Units 4 and 5 could be converted and be on line by 1984 and 1985, respectively. These units are assumed to undergo a 10% derating after conversion (Bivans 1981). The present average net capacity of the two units is 728 MW. After conversion, the units would be derated to a capacity of 655.2 MW. The loss in capacity of 72.8 MW would be replaced by purchased power.

The coal conversion would require coal handling facilities, boiler modifications, air pollution control systems, and ash handling and disposal facilities. Units 4 and 5 would continue to use the cooling lake north of the site to dissipate waste heat and the once-through cooling system serving Unit 3 would continue to be used for wastewater discharges from the entire plant. For coal delivery, the plant will require a new rail spur of 2 to 3 miles from the nearby Seaboard Coast Line Railroad. Coal handling facilities would include unloading facilities, a lined coal pile area, coal conveyors, and pulverizers. A potential site layout for the Sanford Plant site after conversion of Units 4 and 5 to coal-firing is illustrated in Figure 2.6-7. Note that this layout is intended only to illustrate the facilities required and the approximate land area required for the various facilities. The actual layout of a converted coal-fired Sanford Plant could be very different and would be based on detailed studies of the actual suitability of particular areas of the site or other nearby sites for the proposed use.

In the absence of any available boiler design data and on the basis of the derating estimated by FP&L, it is probable that the boilers would not need major modifications. The burners and wind boxes would need to be changed to accommodate coal firing. Retractable sootblowers would need to be added to clean the surface of the boiler tubes in the furnace and superheater. Some modifications may be needed to the superheater and bottom ash sluicing system. The economizer may also need to be changed completely.

Table 2.6-4. Summary of power sources and oil displacement for Alternative 2.*

Source of Power	Capacity (MW)	Capacity kwh/yr $\times 10^6$	Barrels of Oil Displaced ($\times 10^3$ Barrels)
FP&L			
Coal Conversion	655.2	4,017.1	6,480.0
Sanford Units #4 and #5 Purchased Power[1,2]	72.8	446.4	720.0
Total	728.0	4,464.1	7,200.0
No change in generating capacity.			
JEA			
Purchased Power[1,2]	555.0	3,372.6	5,875.0
Net increase in capacity - 550 MW			

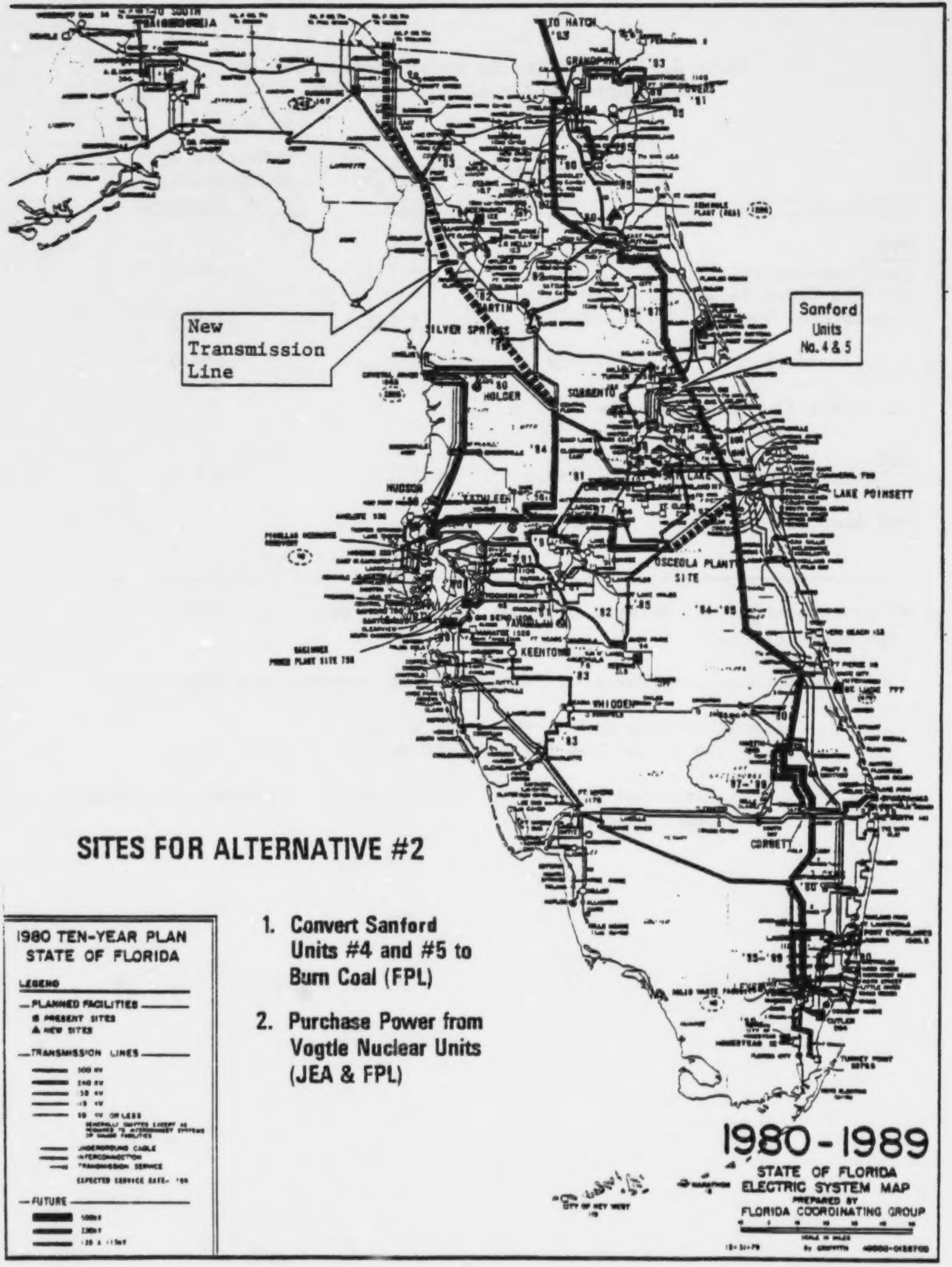
---

*For assumptions and details of power generation data computation, see Appendix CC.

[1] This alternative includes construction of new transmission lines as follows:

Tifton, Georgia to Ft. White (50 miles)
Ft. White to central Florida (100 miles)

[2] Figures indicated are net purchases. Actual amount purchased is 3% higher to account for transmission losses.



New Transmission Line
Sanford Units No. 4 & 5
TO HATCH
GRANDPRINX
POWERS
SILVER SPRINGS
MARTIN
HOLDER
SORRENTO
HUDSON
LAKE POINSETT
OSCEOLA PLANT SITE
KEENTOWN
WHIDDEN
CORBETT
1980 TEN-YEAR PLAN STATE OF FLORIDA
LEGEND
PLANNED FACILITIES
PRESENT SITES
NEW SITES
TRANSMISSION LINES
FUTURE
1980-1989
STATE OF FLORIDA ELECTRIC SYSTEM MAP
PREPARED BY FLORIDA COORDINATING GROUP

SITES FOR ALTERNATIVE #2

1. Convert Sanford Units #4 and #5 to Burn Coal (FPL)
2. Purchase Power from Vogtle Nuclear Units (JEA & FPL)

Figure 2.6-5. Geographic location of major components of Alternative 2.

Figure 2.6-6. Existing Sanford Plant site plan.

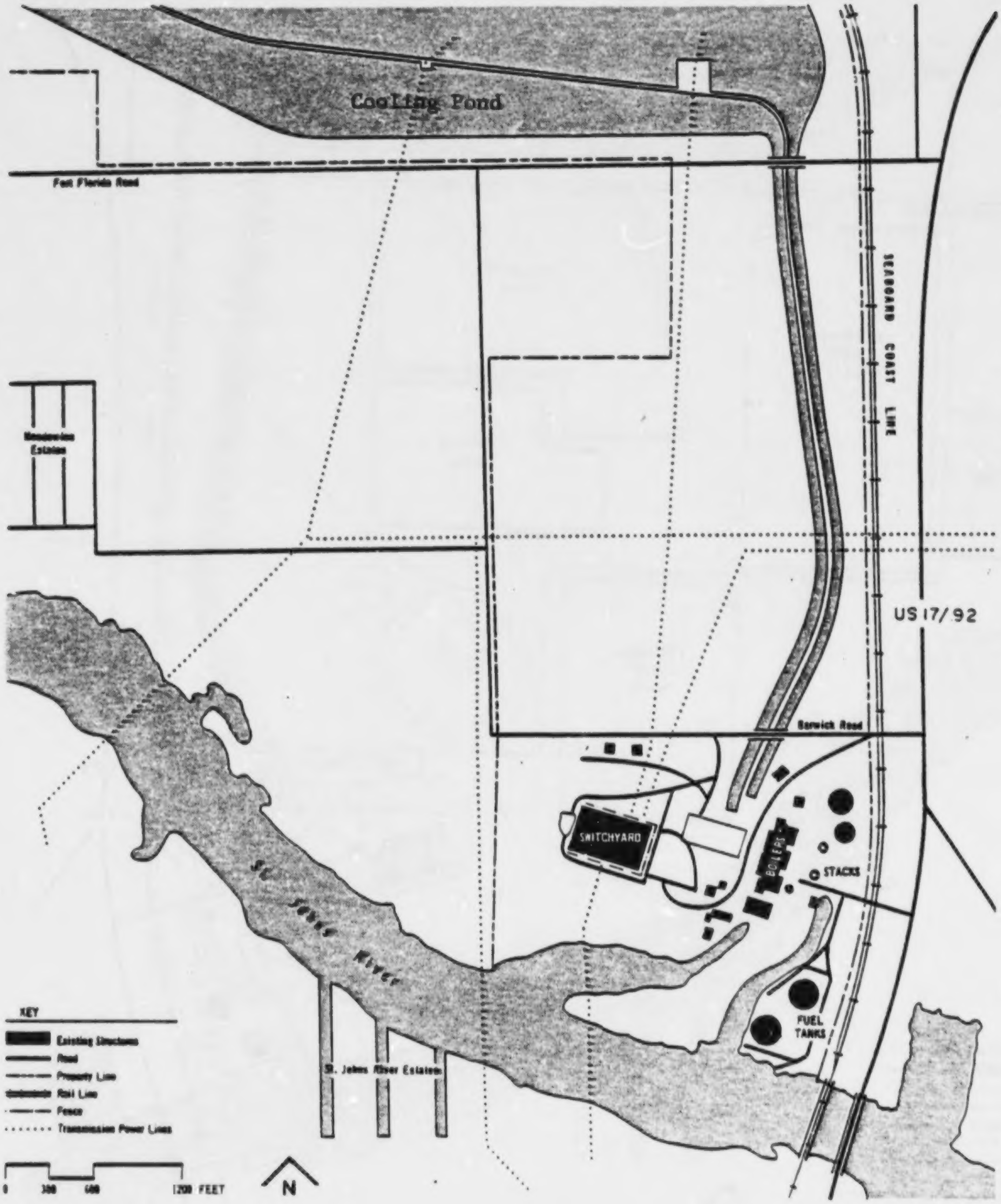
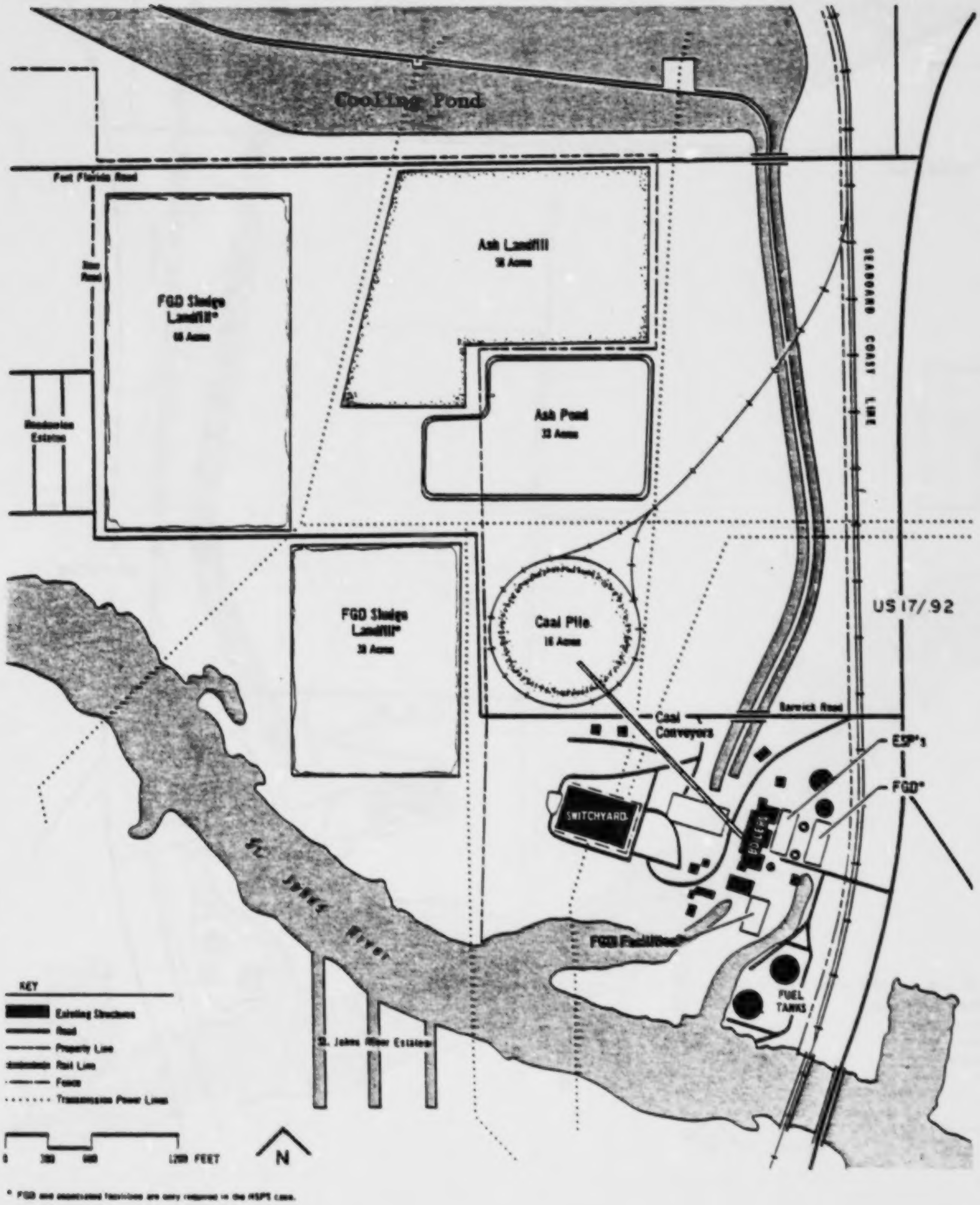

Cooling Pond
Fort Florida Road
Estates
SEABOARD COAST LINE
US 17/92
Barwick Road
SWITCHYARD
BOILERS
STACKS
FUEL TANKS
St. Johns River
St. Johns River Estates
KEY
Existing Structures
Road
Property Line
Rail Line
Fence
Transmission Power Lines
0
300
600
1200 FEET
N

Figure 2.6-7. Potential Sanford Plant site plan with coal conversion.


Cooling Pond
Fort Florida Road
Ash Landfill
Acres
FGD Sludge Landfill*
66 Acres
Ash Pond
33 Acres
Estates
SEABOARD COAST LINE
US 17/92
FGD Sludge Landfill*
38 Acres
Coal Pile
16 Acres
Barwick Road
Coal Conveyors
ESP's
FGD*
SWITCHYARD
BOILERS
FGD Facilities*
FUEL TANKS
St. Johns River
St. Johns River Estates
KEY
Existing Structures
Road
Property Line
Rail Line
Fence
Transmission Power Lines
0
300
600
1200 FEET
N

* FGD and associated facilities are only required in the NSPS case.

The air pollution control system required for the Sanford conversion is dependent upon the regulations enforced by USEPA and FDER. The converted units would have to comply with NSPS if USEPA determines that these units are not currently coal capable. Alternatively, the units would have to comply with the Florida SIP standards if the units are determined to be coal capable or if the amendment to the Clean Air Act which exempts voluntary conversion to coal from the NSPS is adopted. Because of this uncertainty, the analysis of this alternative examines both the NSPS and SIP cases. For the SIP case, SO_2 limits (2.75 lbs/MMBtu) can be met by purchasing intermediate sulfur content (1.6%) coal and would not require a flue gas desulfurization (FGD) system. To meet the particulate standard, electrostatic precipitators (ESP) and induced draft fans to overcome the additional pressure drop would be required. Compliance with the NSPS limitations would require larger ESP's and fans to meet more stringent particulate standards and a flue gas desulfurization (FGD) system to meet the 90% reduction SO_2 limits. The FGD system is assumed to be a limestone wet scrubber with forced oxidation to produce non-commercial grade gypsum. The FGD system consists of the absorber module and all the accessory facilities. The gypsum sludge will be thickened, dewatered, and landfilled on-site.

Coal conversion will result in a significant increase in land requirements for coal storage and handling and ash and FGD sludge disposal. The fly ash will be handled dry and mixed with dewatered FGD sludge for disposal in a lined on-site landfill. The large increase in bottom ash resulting from coal conversion will increase the effluents from the ash system blowdown. The only other significant increases in wastewater would be from coal pile and landfill runoff and wastewater from the air preheater. The estimated changes in land and water requirements, wastewater and solid waste generation, and air emissions due to conversion are shown in Table 2.6-5.

The estimated changes in resource requirements and waste generation at the Sanford Plant reflect several changes in operational factors. Due to the change in fuel, Sanford Units 4 and 5 would be very economical to operate compared to existing oil-fired plants and it is estimated that its capacity factor or time of operation would increase from the 1980 level of less than 50% to 70% after conversion. Thus, although Alternative 2 would result in no additional capacity for FP&L, the change in operation time at Sanford would displace resource requirements and waste generation at other FP&L power plants which would be used less of the time.

Purchased Power

This alternative requires purchase of 550 MW by JEA and 72.8 MW by FP&L. Similar to Alternative 1, the purchase would be a share of the capacity available from Georgia Power's Vogtle Nuclear Power Plant. This alternative will also require construction of 150 miles of 500 kV transmission line to increase the transfer capability into Florida as described in Alternative 1. The purchase of 72.8 MW by FP&L would make up the capacity loss due to derating of Sanford Units 4 and 5. The purchase by JEA would displace 550 MW of oil-fired capacity in the JEA system and would thus reduce the water requirements, air emissions, and wastewater and solid waste generation within the system.

Table 2.6-5. Changes in land and water requirements, air emissions, and wastewater and solid waste generation as a result of converting Sanford Units 4 and 5 to burn coal.

	SIP	NSPS
Land Requirements, acres		
Coal Pile	+24.0	+24.0
Ash Pond	+32.2	+32.2
Ash Landfill	+57.3	+57.9
FGD System	0	+106.0
Total	+113.5	+220.1
Water Requirements, gpm		
Surface	+55.0	+976.0
Wastewater Generation, gpm		
Bottom Ash	+55.0	+55.0
Coal Pile Runoff	+59.0	+59.0
Solid Waste Generation, tpy[1]		
Bottom Ash	+31,137.0	+31,137.0
Fly Ash	+122,925.0	+124,331.0
FGD Sludge	0	+241,061.0
Air Emissions, tpy[1]		
Particulates	+1,623.0	+217.0
SO_2	+21,850.0	-21,340.0
NOx	+4,647.0	+1,634.0
CO	+341.0	+341.0
HC	+152.0	+152.0

Note: For assumptions and details of computations, see Appendix CC.

[1] Total yearly solid waste generation and air emission generation represents the difference between Units #4 and #5 burning coal a at 70% capacity factor (equivalent to 7,200,000 barrels of oil) and burning oil at the 1980 consumption level of 4,725,000 barrels.

2.6.3.4 Alternative 3

Alternative 3 consists of conversion of FP&L's Sanford Units 4 and 5 boilers from burning oil to coal, power purchase by JEA and FP&L from Georgia Power, and construction of a 280 MW coal-fired power plant by JEA at the SJRPP site. The major components of Alternative 3 are geographically located as indicated in Figure 2.6-8. Its major power sources and oil displacement characteristics are summarized in Table 2.6-6. This alternative would result in an oil savings of 7.2 million barrels per year by FP&L and 5.9 million barrels per year by JEA. It would increase the capacity of the JEA system by 550 MW and would not change the capacity of the FP&L system.

Conversion to Coal

As in Alternative 2, FP&L's Sanford Units 4 and 5 would be converted to burn coal instead of oil. This would result in an oil savings of 6.5 million barrels per year at the Plant. The loss of 72.8 MW of capacity due to derating of the units would be made up by power purchase. The modifications of the existing facilities and additional facilities required for conversion, and changes in land and water requirements, air emissions, and wastewater and solid waste generation are the same as those discussed under Alternative 2.

Purchased Power

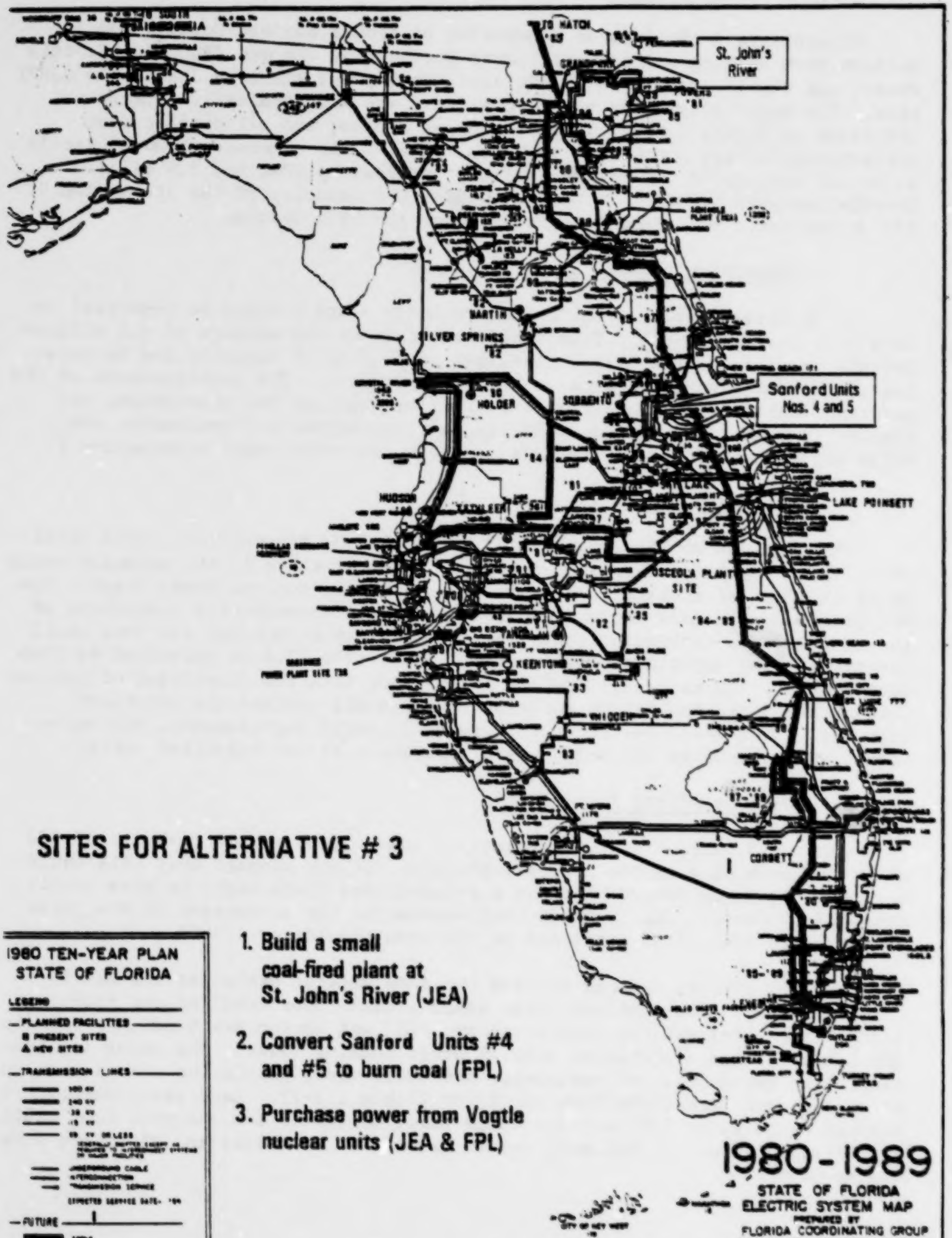
FP&L and JEA would purchase 72.8 MW and 270 MW respectively, or a total of 342.8 MW (net) from Georgia Power. As in Alternative 1, the purchase would be in the form of a share of Georgia Power's Vogtle Nuclear Power Plant. The proposed purchase does not exceed the unallocated transmission capability of the transmission facilities (existing and under construction) and thus would not require any additional transmission lines. The 72.8 MW purchased by FP&L would make up the capacity lost due to derating from the conversion of Sanford Units 4 and 5 and the 270 MW purchase by JEA would replace the oil-fired capacity. This would result in a decrease in water requirements, air emissions, and wastewater and solid waste generation at the oil-fired units.

New Coal-fired Power Plant

JEA would build a smaller coal-fired power plant with a capacity of 280 MW at the same site as the proposed project. It was assumed that this would be a viable option for JEA because a reduced size plant might be more easily financed. However, JEA contends that because of the advantages of the joint venture with FP&L, this might not be the case (Breitmoser 1981).

The new unit is assumed to have the same general design as the SJRPP (Figure 2.6-9). This smaller plant would include coal handling and storage facilities, electrostatic precipitators, FGD, wet bottom ash handling, dry fly ash handling, and a saltwater natural draft cooling tower. The water requirements, air emissions, and wastewater and solid waste generation are assumed to be scaled down from those from the SJRPP (Table 2.6-7). Land requirements are assumed to be about 75% less for solid waste disposal, but the rail loop could not be scaled down by this much and is assumed to be closer to 50% of the size of the SJRPP.

Figure 2.6-8. Geographic location of major components of Alternative 3.



St. John's River
Sanford Units Nos. 4 and 5
TO HATCH
SILVER SPRINGS
HOLDER
HUDSON
SORRENTO
LAKE POINSETT
OSCEOLA PLANT SITE
KEENTOWN
CORBETT
1980 TEN-YEAR PLAN
STATE OF FLORIDA
LEGEND
PLANNED FACILITIES
PRESENT SITES
NEW SITES
TRANSMISSION LINES
UNDERGROUND CABLE
INTERCONNECTION
TRANSMISSION SERVICE
EXPECTED SERVICE DATE
FUTURE
1980-1989
STATE OF FLORIDA
ELECTRIC SYSTEM MAP
PREPARED BY
FLORIDA COORDINATING GROUP

SITES FOR ALTERNATIVE # 3

1. Build a small coal-fired plant at St. John's River (JEA)
2. Convert Sanford Units #4 and #5 to burn coal (FPL)
3. Purchase power from Vogtle nuclear units (JEA & FPL)

Table 2.6-6. Summary of power sources and oil displacement for Alternative 3.*

	Capacity	kwh/yr	Barrels of Oil Displaced
Source of Power	(MW)	x 10^6	(x 10^3 Barrels)
FP&L			
Coal Conversion	655.2	4,017.7	6,480.0
Sanford Units 4 and 5 Purchased Power	72.8	446.4	720.0
Total	728.0	4,464.1	7,000.0
No change in generating capacity.			
JEA			
New Coal Plant	280.0	2,727.0	2,991.0
Purchased Power	270.0	1,655.6	2,884.0
Total	550.0	3,372.6	5,875.0
Net increase in capacity - 550 MW.			

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*For assumptions and details of power generations data, see Appendix CC.

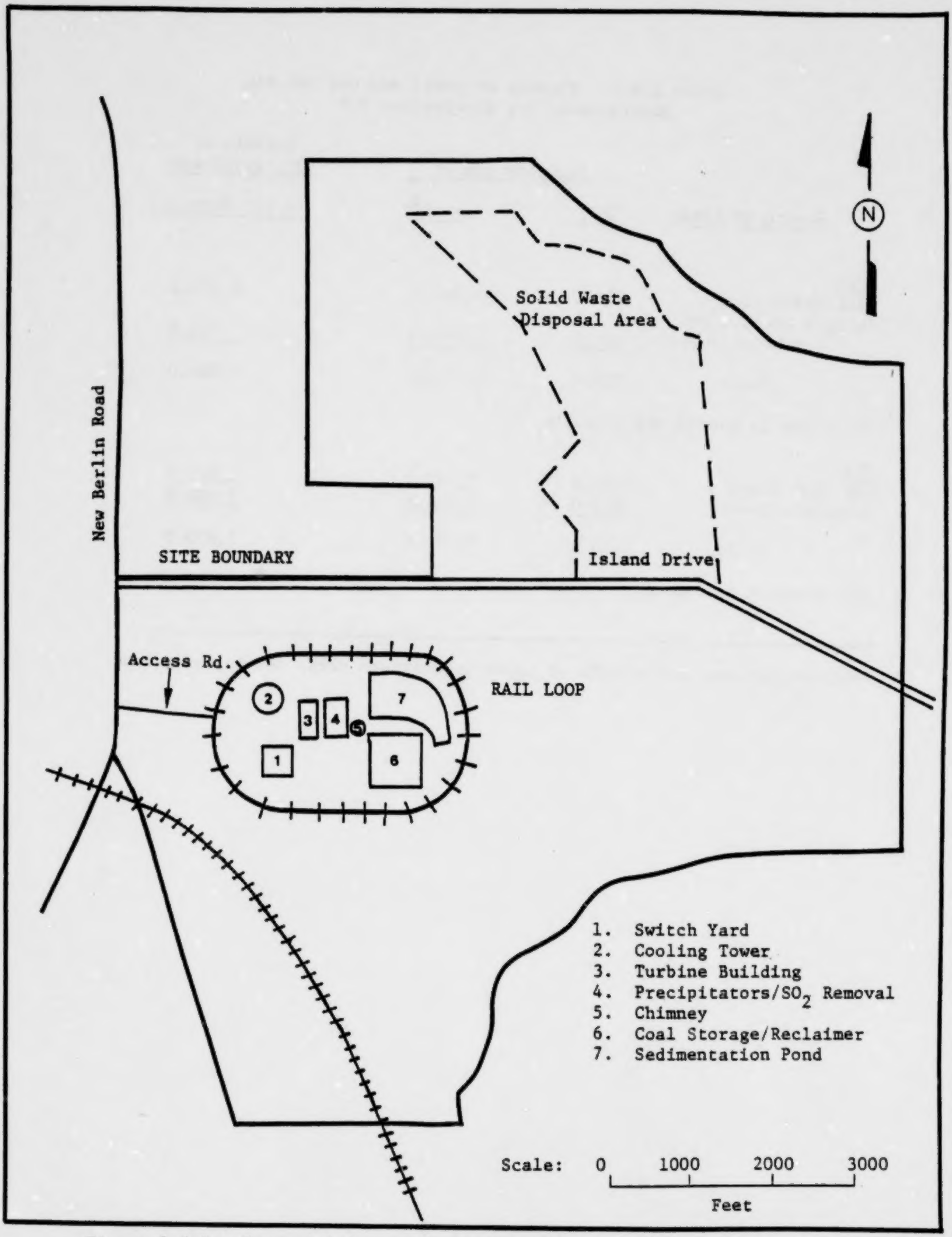
N
New Berlin Road
SITE BOUNDARY
Solid Waste Disposal Area
Island Drive
Access Rd.
RAIL LOOP
1
2
3
4
5
6
7
1. Switch Yard
2. Cooling Tower
3. Turbine Building
4. Precipitators/SO_2 Removal
5. Chimney
6. Coal Storage/Reclaimer
7. Sedimentation Pond
Scale: 0 1000 2000 3000
Feet

Figure 2.6-9. Potential layout for small, 280 MW coal-fired power plant at the SJRPP site.

Table 2.6-7. Summary of land and water requirements, air emissions, wastewater and solid waste generation, for a 280 MW coal-fired power plant at the SJRPP site.

Land Requirements, Acres	
Landfill	138
Plant (rail loop)	167
Buffer (remainder of SJRPP)	1,351
Total	1,656
Average Water Requirements, gpm	
Surface	10,320
Groundwater	922
Average Wastewater, gpm	
Cooling Tower Blowdown	7,170
Demineralizer	7
Boiler Blowdown	27
Sanitary Waste	4
FGD Blowdown	308
Runoff	41
Heat Discharge BTU x 10^6/hr to Surface Water	3.19
Solid Waste, tpy (x 10^3)	
Bottom Ash	12.5
Fly Ash	50.6
FGD Sludge	109.5
Air Emissions, tpy	
Particulate	287
SO_2	7,288
NO_x	5,754
CO	479
HC	5

2.6.3.5 Alternative 4

Alternative 4 consists of converting FP&L's Sanford Units 4 and 5 and JEA's Northside Unit 3 boilers from burning oil to coal and power purchases by JEA and FP&L. Figure 2.6-10 indicates the geographic locations of the major components of Alternative 4. Its major power sources and oil displacement characteristics are summarized in Table 2.6-8. This alternative would result in an oil savings of 7.2 million barrels per year by FP&L and 5.9 million barrels per year by JEA. It would also increase the capacity of the JEA system by 72.8 MW and would not change the capacity of the FP&L system.

Table 2.6-8. Summary of power sources and oil displacement for Alternative 4*.

Source of Power	Capacity (MW)	Capacity kwh/yr x 10^6	Barrels of oil displaced (x 10^3 barrels)
FP&L			
Coal Conversion Sanford Units 4 and 5	655.2	4,017.7	6,480.0
Purchased Power	72.8	446.4	720.0
Total	728.0	4,464.1	7,200.0
No change in generating capacity.			
JEA			
Coal Conversion Northside Unit 3	231.0	1,416.5	2,467.0
Purchased Power	319.0	1,956.1	3,408.0
Total	550.0	3,372.6	5,875.0
Net increase in generating capacity of 72 MW.			

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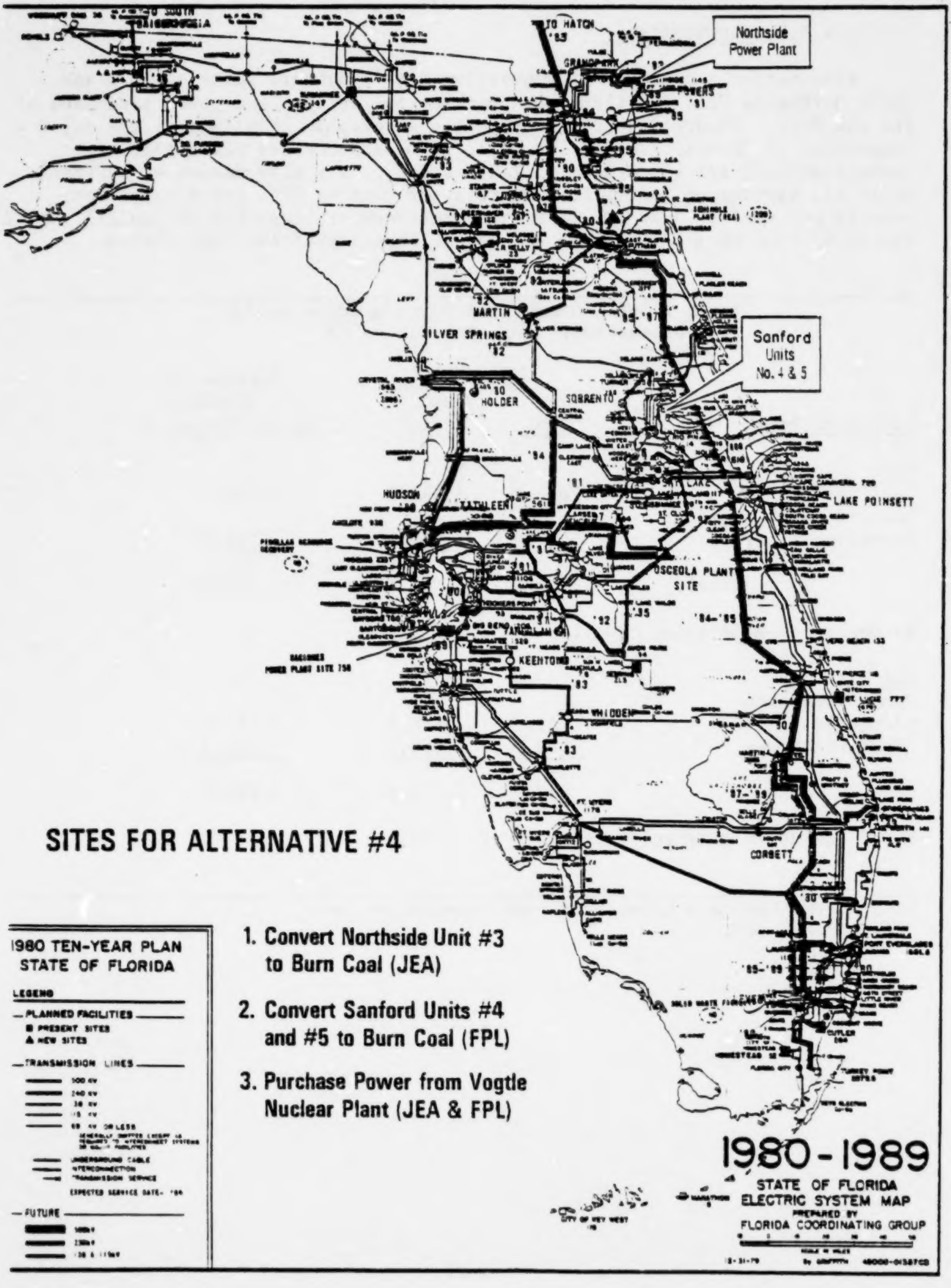
*For assumptions and details of power generation data, see Appendix CC.

Figure 2.6-10. Geographic location of major components of Alternative 4.


Northside Power Plant
Sanford Units No. 4 & 5
TO HATCH
SILVER SPRINGS
MARTIN
HOLDER
SORRENTO
HUDSON
LAKE POINSETT
OSCEOLA PLANT SITE
KEENTOWN
WHIDDEN
CORBETT
SITES FOR ALTERNATIVE #4
1. Convert Northside Unit #3 to Burn Coal (JEA)
2. Convert Sanford Units #4 and #5 to Burn Coal (FPL)
3. Purchase Power from Vogtle Nuclear Plant (JEA & FPL)
1980 TEN-YEAR PLAN
STATE OF FLORIDA
LEGEND
PLANNED FACILITIES
PRESENT SITES
NEW SITES
TRANSMISSION LINES
500 KV
240 KV
UNDERGROUND CABLE
INTERCONNECTION
TRANSMISSION SERVICE
EXPECTED SERVICE DATE
FUTURE
1980-1989
STATE OF FLORIDA
ELECTRIC SYSTEM MAP
PREPARED BY
FLORIDA COORDINATING GROUP

Conversion to Coal

As in Alternative 2, FP&L's Sanford Units 4 and 5 would be converted to burn coal instead of oil. This would result in an oil savings of 6.5 million barrels per year. The loss of capacity of 72.8 MW due to derating of the units would be made up by power purchases. The modifications of the existing facilities and additional facilities required for conversion and changes in land and water requirements, air emissions, and wastewater and solid waste generation are the same as those discussed under Alternative 2.

Under this alternative, JEA's Northside Unit 3 would also be converted to burn coal instead of oil. This conversion would result in an oil savings of 2.5 million barrels per year. The conversion would result in a significant derating of the unit (46%) and thus, the net capacity of Northside Unit 3 when firing coal would be 54% of its current maximum continuous rating or 231 MW.

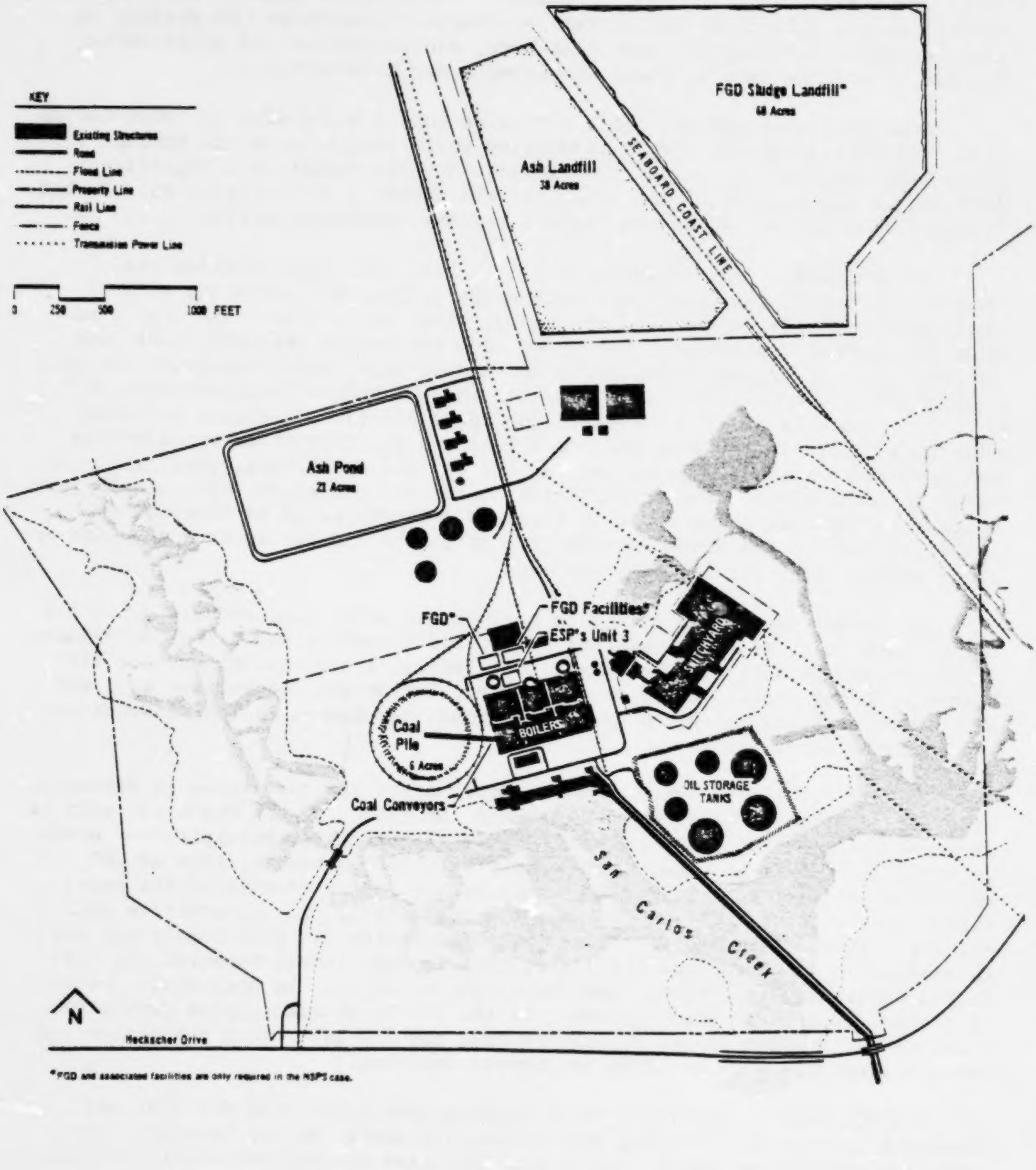
The modifications to convert Unit 3 to burn coal would include coal storage and handling facilities, furnace alteration, air pollution control equipment, and solid waste handling and disposal facilities. The coal handling system will consist of a rail spur from the nearby Seaboard Coast Line Railroad, a coal unloading system, a lined coal pile, coal conveyors, and coal pulverizers. A potential site layout for the NGS site after conversion of Unit 3 to coal-firing is illustrated in Figure 2.6-11. It should be noted that this layout is intended only to illustrate the facilities required and the approximate land area required for the various facilities, coal pile, and waste disposal areas. The actual layout of a coal converted NGS could be very different from that illustrated in Figure 2.6-11 and would be based on detailed studies of the actual suitability of the particular area of the site or other nearby sites for the proposed use.

The conversion of NGS Unit 3 to coal-firing would also require extensive boiler modifications (Sherlock 1981). The modifications would include primary air fans, new burners and windboxes, sootblowers, a new economizer, new air heater surfaces, modified gas recirculation, bottom ash, economizer ash, and air heater ash removal system as well as possible changes in the superheater and reheater surfaces.

The air pollution control system required for the conversion is dependent upon the regulations enforced by USEPA and the FDER. If the converted unit is required to comply with SIP standards, only electrostatic precipitators would be required. If it is required to comply with NSPS, however, then an FGD system in addition to a larger ESP would be required. Because of the uncertainty of the applicable regulations, the analysis of this alternative will examine both the NSPS and SIP cases. The FGD system for NSPS compliance will be similar to that proposed for SJRPP, that is, wet limestone scrubbing with forced oxidation, thickening, and dewatering as well as an open-cycle system to produce commercial grade gypsum. If the FGD by-product gypsum cannot be sold, it will be landfilled separately from the fly ash. Both the gypsum and the ash landfills will be lined to prevent leaching.

The NGS Unit 3 conversion would require additional land for coal and limestone storage and handling facilities, ash ponds, an ash landfill, air pollution control equipment, and in the NSPS case an FGD by-product landfill.

Figure 2.6-11. Potential Northside Unit 3 site plan for coal conversion.


KEY
Existing Structures
Road
Flood Line
Property Line
Rail Line
Fence
Transmission Power Line
0
250
500
1000 FEET
FGD Sludge Landfill*
68 Acres
Ash Landfill
38 Acres
SEABOARD COAST LINE
Ash Pond
21 Acres
FGD*
FGD Facilities*
ESP's Unit 3
SWITCHYARD
Coal Pile
6 Acres
BOILERS
Coal Conveyors
OIL STORAGE TANKS
San Carlos Creek
N
Heckscher Drive

*FGD and associated facilities are only required in the NSPS case.

The conversion would result in an increase in runoff from the coal pile and ash landfill and blowdown streams from the bottom ash and FGD systems. There would be a decrease in the discharge from the once-through cooling system, the boiler blowdown, and the demineralizer wastewater due to the derating of the boilers. However, the use of a by-product grade gypsum producing FGD system such as that proposed for the SJRPP would result in a net increase of groundwater use for the NSPS case. The estimated changes in resource requirements and waste generation characteristics for NGS Unit 3 after coal conversion are indicated in Table 2.6-9.

Purchased Power

FP&L and JEA would purchase 72.8 MW and 319 MW, respectively, or a total of 391.8 MW (net) of power from Georgia Power. As in Alternative 1, the purchase would be in the form of a share of Georgia Power's Vogtle Nuclear Power Plant. Although this quantity exceeds the remaining unallocated transmission capability of 350 MW in 1987 by 41.8 MW, it is improbable that a new 500 kV line would be constructed for this small amount. It is more likely that JEA and FP&L would arrange to use a small amount of capacity allocated to FPC and the City of Tallahassee. Therefore, no construction of a new transmission line is associated with this alternative.

The 72.8 MW purchased by FP&L will make up the capacity lost from derating during the conversion of the Sanford Units 4 and 5. The 319 MW purchased by JEA would compensate for the 247 MW lost due to derating or conversion of the Northside Unit 3, and 72 MW would displace the oil-fired capacity.

2.6.4 Economic Analysis of the Alternatives Including the Proposed Project

Because the main justification for building the SJRPP in the proposed time frame is the cost savings that could be realized by displacing expensive oil-fired generation, an economic analysis was conducted to demonstrate whether or not the alternatives satisfy this goal also. It should be noted that this economic analysis focuses solely on the capital and operating costs of each alternative for displacing oil-fired generation and does not attempt to quantify the value of the differing levels of additional generating capacity provided by each. The analysis also does not attempt to weigh other economic and non-economic factors which must be considered by utility management in selecting and implementing a long-range generation plan. Accordingly, the relative economics of the alternatives were assessed as follows:

- The costs of continuing to burn oil (No Action Alternative) were estimated along with the number of barrels of oil which would be consumed. Costs were estimated in constant 1981 dollars for a period up to the year 2000, then reduced to a present worth.

- The costs in 1981 dollars associated with the SJRPP and the four alternatives were calculated up to the year 2000 and reduced to present worth terms. A check was run to verify that these independently estimated costs did not conflict with those estimated by JEA and FP&L for the SJRPP. The costs of the alternatives were also computed assuming high, medium, and low costs for oil and coal to show how the economics of the alternatives would vary according to the price of fuel.

Table 2.6-9. Land and water requirements, air emissions, and wastewater and solid waste generation characteristics of JEA's Northside Unit 3 after conversion to burn coal*

	SIP	NSPS
Land Requirements, acres		
Coal Pile	+9.1	+9.1
Ash Pond	+21.0	+21.0
Ash Landfill	+37.8	+38.2
FGD System	0	+68.6
Total	+67.9	+136.9
Water Requirements, gpm		
Surface Water	-121,363.0	-121,363.0
Groundwater	-205.0	+393.0
Wastewater Generation, gpm		
Cooling System	-121,363.0	-121,363.0
Coal Pile Runoff	+23.0	+23.0
Demineralizer	-13.0	-13.0
Boiler Blowdown	-173.0	-173.0
Bottom Ash Blowdown	+23.0	+23.0
FGD Blowdown	0	+226.0
Solid Waste Generation, tpy		
Bottom Ash	+12,066.0	+12,066.0
Fly Ash	+48,032.0	+48,032.0
FGD Sludge	0.0	+91,636.0
Air Emissions, tpy		
Particulates	+76.4	+229.0
SO_2	+15,120.0	+4,582.0
NO_x	+5,727.0	+4,582.0
CO	+319.0	+319.0
HC	+95.0	+95.0

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* For assumptions and details of computations, see Appendix CC.

Note: Water requirements, wastewater and solid waste generation, and air emissions represent the difference between Unit 3 burning coal at a 70% capacity factor and oil-generating capacity displaced due to conversion.

- The costs of the No Action, proposed action, and the four alternatives were then converted into a common quantifiable expression -- present worth dollars per barrel of oil saved or burned. In the case of the No Action Alternative, it is the cost per barrel of oil burned; for the other cases, it is the cost per barrel of oil saved.

The above approach provides a means of comparing alternatives on a common and easily understood basis, that is, the relative cost of burning or displacing a barrel of oil. The relative cost of the No Action Alternative, the SJRPP, and the four new alternatives are described in this section in terms of total present worth cost and cost per barrel of oil burned or saved. As suggested previously, due to the great difference in the level of detail in design and costing between the SJRPP and the other alternatives, the costs presented can only be considered as indicators of oil savings, not absolute indicators of the relative expense of implementing one of the alternatives as opposed to the SJRPP.

The comparative cost of each of the alternatives per barrel of oil burned or displaced is shown in Table 2.6-10. A number of special case studies and underlying assumptions regarding the figures presented in Table 2.6-10 must be understood in order to fully appreciate the costs. The special cases were analyzed to attempt to make the economic analysis reflect as many of the real world variations in the costs of fuel and construction as possible. These factors are explained in detail in Appendix BB and are briefly summarized as follows:

- Three variations in the cost of fuel (oil and/or coal) are presented for each alternative as indicated under the heading "Price Track." The low price case generally assumes no increase above base inflation over the period between 1981 and 2000. The medium case is based on the latest DOE crude oil price forecast (2-4% annual growth) and the high case is based on a more rapid increase in prices through the 1980's followed by a leveling off in the 1990's. Medium prices should be used for comparison.

- The cost-effectiveness of the Blount Island coal unloading facility was questioned by the FPSC during the need certification hearing and in the FPSC's final order. Therefore, the costs of the proposed project are shown both with and without the Blount Island coal terminal.

- As indicated previously, in each case involving the coal conversion of FP&L's Sanford Units 4 and 5 or JEA's Northside Unit 3, there is uncertainty about the level of control of SO_2 that will be required by USEPA and FDER. The cost of each alternative involving a coal conversion (Alternatives 2, 3, and 4) is first shown in Table 2.6-10 as required to meet SIP limitations. The cost of each alternative involving coal conversion is then shown as it would be with the scrubbers and larger ESP's required to meet NSPS, a higher level of emission control.

Table 2.6-10. Summary comparison of the cost of the SJRPP and alternatives in terms of $ per barrel of oil burned or displaced

Utility	Price Track	No-Action	SJRPP	SJRPP plus Blount Is.	Alternative 1	Alternative 2	With Scrubber	A	B	Alternative 3	With Scrubber	Alternative 4	With Scrubber
	High	40.67	20.74	21.17									
JEA	Medium	32.95	17.83	18.26	18.01	16.99	n/a	21.94	23.13	18.71	n/a	19.07	19.69
	Low	23.13	14.13	14.57									
	High	40.39	26.95	27.78									
FPL	Medium	32.67	23.80	24.64	39.77	20.49	23.39	24.32	24.43	20.11	23.01	20.11	23.01
	Low	22.85	19.81	20.64									
	High	40.53	23.72	24.35									
Combined	Medium	32.81	20.70	21.33	28.31	19.03	20.72	23.32	23.89	19.53	21.22	19.67	21.61
	Low	23.00	16.86	17.49									

Key: A = Alternative 2/scrubber, plus 50 percent overrun on Vogtle costs.
B = A plus nuclear fuel escalating at the medium oil price rate.

- Large cost overruns have not been uncommon for new nuclear generating facilities over the last few years. Even including the recently announced (23 September 1981) overrun and schedule delay, the estimated costs of Plant Vogtle supplied by Georgia Power could be low. To test the effect that additional cost overruns would have on the cost of the alternatives, two test cases were run for Alternative 2 in which a 50% construction cost overrun (2A) and a 50% construction cost overrun plus an escalation of nuclear fuel costs (2B) were considered.

Based on the cost analysis described above, the following conclusions were drawn:

- For JEA, the proposed project and all of the alternatives are far less expensive than continuing to burn oil. However, the low cost of the alternatives to JEA is closely linked to purchases of power from Plant Vogtle and not to the various fuel conversion and small scale power options. The relationship of the cost per barrel of oil displaced by each of the technologies used in the alternatives is shown in Table 2.6-11. As shown in Table 2.6-11, the elements of the alternatives for JEA including NGS coal conversion, small coal plant, and small scale options are actually relatively expensive. However, when these components are included in an alternative their costs are masked by the very low estimated cost of purchasing power from Plant Vogtle. In spite of this, coal-oil mixture conversion and the purchase of power do appear to be inexpensive enough to make the alternatives economically attractive for JEA.

- The savings to FP&L from displacing oil are less than for JEA. This is because of FP&L's higher cost of capital and the fact that FP&L currently uses oil more efficiently than JEA (and so has less to gain). Nevertheless, SJRPP is clearly less expensive than continuing to burn oil. Note that savings for FP&L associated with Alternatives 2, 3, and 4 rely heavily on coal conversion of Sanford Units 4 and 5. This appears to be an economically attractive option for FP&L (Table 2.6-11). FP&L has indicated its intention to pursue coal conversion in addition to and independent of SJRPP if conversion is shown to be technically and economically feasible. Alternative 1 is prohibitively expensive for FP&L; more expensive than continuing to burn oil. This reflects the very high capital cost of refuse and solar power.

- The combined results show that all of the alternatives except Alternative 1 are less expensive than continuing to burn oil and that Alternatives 2, 3, and 4 are comparable or greater in savings than SJRPP. In summary, it appears that three of the four alternatives can also meet the economic criteria used to justify construction of SJRPP at this time, that is, they displace oil-fired generation at a low cost.

The final economic consideration in the analysis of the alternatives is the long-term effect of the differing levels of new capacity provided by each.

Table 2.6-11. Cost in terms of $ per barrel of oil burned or displaced for each of the technologies involved in Alternatives 1, 2, 3 and 4.

	$ per Bbl. of Oil Saved or Consumed					
	JEA			FPL		
System	H	M	L	H	M	L
No action	40.67	32.95	23.13	40.39	32.67	22.85
Proposed action (SJRPP)	20.74	17.83	14.13	26.95	23.80	19.81
Vogtle (without transmission costs or interim purchase of power)		15.19			29.08	
Coal conversion:						
Sanford without scrubber		-----			19.27	
Sanford with scrubber		-----			22.45	
Northside without scrubber		23.11			-----	
Northside with scrubber		24.54			-----	
Coal-oil mixture (Northside)		17.62			-----	
Small coal plant		21.37			-----	
Solar domestic hot water		37.91			62.28	
Refuse-fired generation		21.77			37.21	

Key: H = high oil and coal prices
M = medium oil and coal prices
L = low oil and coal prices

As shown in Table 2.6-12, the SJRPP provides the largest increase in capacity followed by Alternatives 1, 2, 3, and 4.

Table 2.6-12. Net increase in system capacity (MW) provided by the proposed project and each alternative,

	No Action	SJRPP	Alternative 1	Alternative 2	Alternative 3	Alternative 4
JEA	0	550	288.4	550	550	72
FPL	0	550	550.4	0	0	0
TOTAL	0	1,100	778.4	550	550	72

In order to make the alternatives truly comparable in terms of projected power needs, additional capacity would have to be added to Alternatives 1, 2, 3, and 4. This implies future costs which have not been factored into this analysis.

3.0 AFFECTED ENVIRONMENT

This chapter describes the existing environment at those locations which could potentially be affected by the proposed project or the other alternatives under evaluation. Due to the complexity of the alternatives analysis which includes alternatives located outside of the impact area of the proposed project, it was necessary to characterize the baseline environment at several different locations in Florida. These locations include the impact areas encompassing Jacksonville and Sanford, Florida, as well as the site specific existing environments at the proposed St. Johns River Power Park (SJRPP), the Northside Generating Station (NGS), Blount Island, and the Sanford Plant. Although several of the alternatives include components which are located in other portions of Florida (Brevard, Manatee, Seminole, and Sarasota Counties as well as the transmission line corridor), no specific sites have been identified for these components and consequently no baseline environment could be characterized. In addition, no existing environment has been characterized for Georgia Power's Plant Vogtle since this project is already certified and under construction. For purposes of analysis it is assumed that the impacts of Plant Vogtle construction and operation will occur regardless of whether JEA and FP&L purchase power from Georgia Power or not.

3.1 AIR RESOURCES

This section provides a summary of the existing air resources in the vicinity of the SJRPP/NGS and Sanford Plant. A detailed analysis of existing air resources is presented in Appendix K.

3.1.1 Climatological/Dispersion Characteristics

3.1.1.1 SJRPP/NGS

The terrain surrounding the SJRPP/NGS sites is level. Easterly maritime winds blow about 40% of the time which produces a more moderate climate. Summers are long, warm, and relatively humid; winters are mild, but occasionally interrupted by invasions of cool to occasionally cold air from the north. The following summary of existing climatological conditions at the SJRPP/NGS sites is based on data for the period 1941 to 1970 (USDOC 1978)(Appendix K).

The annual mean temperature at Jacksonville is 68.4°F. June, July, and August are the hottest months, with temperatures averaging near 80°F. December, January, and February are the coolest months with mean temperatures near 55°F. In winter, temperatures fall to freezing or lower about 12 times per year. Annual rainfall averages 54.5 inches. Rainfall averages over 7 inches per month during the summer. Very infrequently, heavy rains associated with tropical storms reach amounts of several inches. The driest months are November, December, and January when precipitation averages less than three inches per month. The highest annual average 10-year, 24-hour rainfall is about 7.5 inches. The 100-year, 24-hour rainfall is about 11 inches (USDOC 1961).

The average relative humidity is about 75%. In the early morning relative humidities average about 90% while afternoon relative humidities average 55%. Daily sunshine in December averages 5.5 hours; in May the average daily sunshine is 9.0 hours.

Prevailing winds are northeasterly in autumn and winter and southwesterly in spring and summer. Wind speeds average slightly less than 9 miles per hour overall. Wind speeds are slightly higher during spring than in other seasons. The mean annual morning mixing height at Jacksonville is 1,600 feet (500 m). Afternoon mixing heights average about 4,600 feet (1,400 m) annually (USEPA 1972).

The Jacksonville area has escaped most hurricane force winds. Hurricanes tend to move parallel to the coast and keep well out to sea or lose much of their force by moving over land before reaching the area.

3.1.1.2 Sanford

The climate in the Sanford area is modified greatly by the numerous lakes in the region and by the Atlantic Ocean. These maritime influences produce moderate winters and summers (USDOC 1978). The following information summarizes the climatological/dispersion characteristics for Sanford. A detail discussion of this subject can be found in Appendix K.

The normal average daily temperature in the Sanford area is 71.8°F. In the summer months, the average high temperature is 90°F and the average low is 73°F. Winter temperatures average 71°F with average high and low temperatures of 71°F and 51°F respectively. The normal annual precipitation in the Sanford area is 51.21 inches. During June to September, the rainy season, monthly rainfall averages between 6.73 inches and 8.29 inches. The dry season occurs during November, December, and January when monthly rainfalls of less than 2.5 inches occur. The average 10-year, 24-hour rainfall is 7.4 inches. The 100-year, 24-hour rainfall is about 11 inches (USDOC 1961).

Nighttime relative humidities average 90% during the summer and 86% annually. Afternoon relative humidities average between 40% and 50% in April and May and 60% in the summer months. The mean cloud cover is greatest during the summer months (65% average cloud cover). In November and April average cloud cover is lowest (49% and 51%, respectively). There are 93 clear days and 148 partly cloudy days annually on the average.

Prevailing winds are from the north and northeast during the autumn and winter, and from the south in the spring and summer. Wind speed averages are slightly higher in winter and early spring (9.0 to 10.0 mph) than in summer (7.3 to 7.8 mph). The mean annual morning mixing height at Sanford is approximately 2,000 feet (600 m). Average mixing heights are about 4,600 (1,400 m) on an annual basis (USEPA 1972). Hurricanes are not a great threat to the Sanford area since they must pass over a substantial stretch of land and thereby lose much of their energy.

3.1.2 Air Quality

3.1.2.1 SJRPP/NGS

Regional Air Quality Data

The area of Jacksonville bounded by the St. Johns River on the east and south, Trout River on the north, and I-95 on the west is a designated non-attainment area for TSP. Violations of both the annual standard (60 ug/m^3) and the 24-hour standard (150 ug/m^3) are indicated. Average TSP annual values of less than 40 ug/m^3 and average 24-hour values less than 90 ug/m^3 are indicative of the outlying areas of Jacksonville.

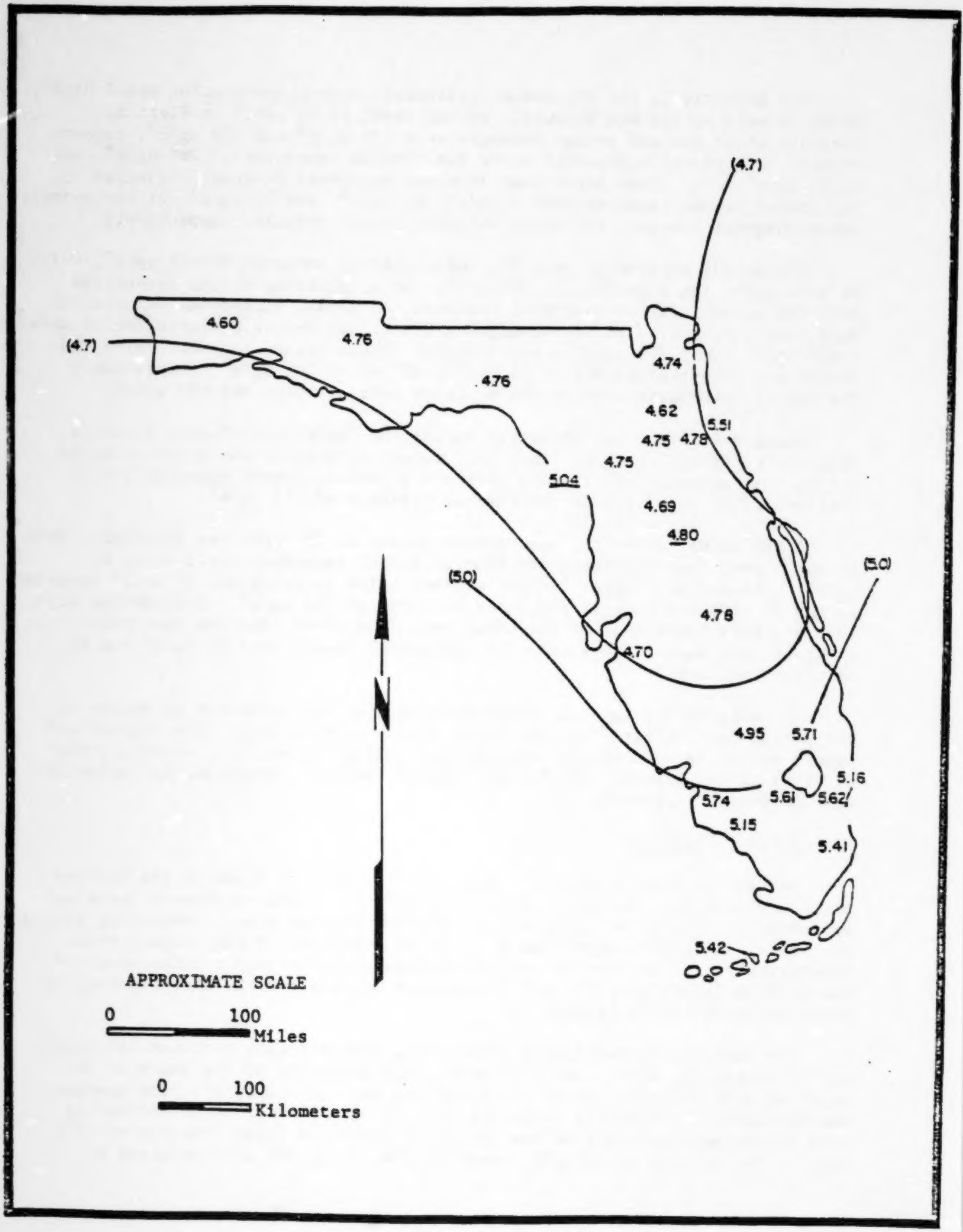
Annual values of SO_2 in the outlying areas of Jacksonville are 5 to 15 ug/m^3. However, annual values of 20 ug/m^3 have been reported close to major emissions sources. Highest 24-hour averages in the outlying areas are primarily in the range of 30 to 60 ug/m^3, whereas monitors close to the major emissions sources have recorded highest 24-hour averages of 100 to 200 ug/m^3 and highest 1-hour averages of 400 to 900 ug/m^3. Most of the monitors are significantly influenced by the existing major SO_2 sources. All of the Jacksonville area is in attainment of the NAAQS for SO_2.

Annual NO_2 concentrations in outlying areas average less than 20 ug/m^3, whereas downtown values are about 40 ug/m^3. Some monitors are affected by major point sources and others are presumably influenced by transportation sources. Maximum CO levels are about 8,000 ug/m^3 (8-hour average) and 14,000 ug/m^3 (1-hour average). These levels are well below the allowable standard of 10,000 ug/m^3 (8-hour average) and 40,000 ug/m^3 (1-hour average). The 1-hour average State standard for ozone of 160 ug/m^3 is often exceeded in the warm summer months; however, maximum values reported have been nearly 300 ug/m^3. The entire Jacksonville area is designated as non-attainment of the NAAQS for ozone.

Sulfates are associated with acidic precipitation and therefore have received much attention recently even though there are no ambient standards for sulfates. FDER sampled sulfate levels in the Jacksonville area during 1979. A mean concentration of 9.06 ug/m^3 and high and low values of 18.20 ug/m^3 and 2.90 ug/m^3, respectively, were observed. As part of a statewide study, Brezonik, et al. (1980) investigated the precipitation chemistry at a monitoring station near the Jacksonville International Airport. A mean volume-weighted precipitation pH of 4.69 was recorded for the Jacksonville Station for the 1979 calendar year (total rainfall was 157 cm.). For the period from 1 May 1978 to 30 April 1979, the volume-weighted pH was 4.74 with a total rainfall of 122 cm. Other values observed in the State are shown in Figure 3.1-1. It should be recognized, however, that there is great variability within the data on a seasonal basis and even within rainfall events.

SJRPP Project Site Air Quality Data

An on-site baseline air quality and meteorology monitoring program was conducted from December 1979 to December 1980 (JEA/FP&L 1981a). The results of this program served as the basis for the air quality modeling and impact assessment. Data were collected for sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, total suspended particulates, lead, and a number of trace elements. Two air quality baseline scenarios were generated as part of the monitoring program. Scenario 1 considers ground level concentrations with respect to all wind angles. Scenario 2 considers monitoring data gathered in conjunction with winds from 290 degrees clockwise through 160 degrees (corresponding roughly with the northwest, northeast, and southeast quadrants). Ground level concentrations measured when wind blew from these directions are considered to represent background levels since there are no major pollutant sources upwind in those directions (JEA/FP&L 1981a).



(4.7)
4.60
(4.7)
4.76
4.76
4.74
4.62
5.51
4.75
4.78
4.75
5.04
4.69
4.80
(5.0)
(5.0)
4.78
4.70
4.95
5.71
5.16
5.74
5.61
5.62
5.15
5.41
5.42
N
APPROXIMATE SCALE
0
100
Miles
0
100
Kilometers

Figure 3.1-1. Volume-weighted mean pH of precipitation throughout Florida for the period May 1978 through April 1979 (Brezonik et al. 1980).

For Scenario 1, the SO_2 annual arithmetic mean concentration was 7 ug/m^3, which is well within the allowable annual level of 60 ug/m^3 in Florida. Second-highest 24- and 3-hour averages were 116 ug/m^3 and 289 ug/m^3, respectively, both of which are well below the Florida standards of 260 ug/m^3 and 1,300 ug/m^3. For winds other than from the southwest quadrant (Scenario 2), background values measured were 4 ug/m^3, 21 ug/m^3, and 90 ug/m^3 for the annual, second-highest 24-hour, and second-highest 3-hour periods, respectively.

The annual arithmetic mean NO_2 concentration recorded was 12 ug/m^3, which is well below the standard of 100 ug/m^3. By eliminating values associated with the winds from the southwest quadrant, an annual background value of 10 ug/m^3 was computed. The second-highest 8-hour and 1-hour averages for CO were 4,500 ug/m^3 and 5,200 ug/m^3, respectively. These values are well below the 8-hour and 1-hour standards of 10,000 ug/m^3 and 40,000 ug/m^3, respectively. The annual arithmetic mean carbon monoxide concentration was 600 ug/m^3.

Ozone monitoring was conducted during the "warm season" only (that is, from April through October) since the highest concentrations normally occur during this period. The results indicate a second-highest measured 1-hour average of 210 ug/m^3 versus the Federal standard of 235 ug/m^3.

A TSP annual geometric mean concentration of 29 ug/m^3 was observed. This is much lower than the State and Federal annual secondary standard of 60 ug/m^3. The second-highest 24-hour average value recorded was 57 ug/m^3 compared to the Florida and Federal secondary standard of 150 ug/m^3. Considering days when at least two-thirds of the winds were from other than the southwest quadrant, the annual and short-term background levels were 27 ug/m^3 and 50 ug/m^3, respectively.

An analysis for several trace elements also was conducted on twelve of the particulate filters (one per month selected at random). The highest and lowest values as well as the mean concentrations for sulfate, nitrate, chloride, fluoride, arsenic, beryllium, cadmium, mercury, selenium, and asbestos were determined (Appendix K).

3.1.2.2 Sanford

Ambient monitoring data are available for several sites in the Sanford project site area. The first monitoring site is located in Benson Junction approximately two miles north of the proposed project site. Monitoring site 2 is located in Sanford approximately 4 miles southeast of the project site. Monitoring site 3 is located west of Sanford approximately 2 miles south of the Sanford Plant. The SO_2 and TSP monitoring data for the three monitoring sites is presented in Appendix K.

The maximum second-highest 24-hour SO_2 concentration recorded (60 ug/m^3) was at monitoring site 1 and represents only about 16% of the NAAQS of 365 ug/m^3 or approximately 23% of the State standard of 260 ug/m^3. The maximum second-highest 24-hour TSP concentration (90 ug/m^3) occurred at monitoring site 3 and represents 60% of the secondary NAAQS and State standard of 150 ug/m^3. The maximum annual TSP concentration (49 ug/m^3) also occurred at monitoring site 3 and represents approximately 65% of the NAAQS and approximately 82% of the Florida standard.

3.1.3 Existing Air Pollution Sources

The locations of the major pollutant sources in the area are depicted in Figure 3.1-2. In addition to these major sources, there are a large number of minor sources in the area which also contribute to air pollution. The emission characteristics, stack parameters, and locations of the significant existing sources in the area for SO_2 and TSP in addition to those for the proposed plant are presented in Appendix K. It should be noted that the JEA Southside and Kennedy emission and stack height data presented in Appendix K are likely to change due to a modeled violation by FDER of the 24-hour SO_2 Florida Ambient Air Quality Standard (FAAQS). The actions necessary to eliminate the violation are currently being negotiated between FDER and JEA (Moehle 1981e).

3.1.4 Regulatory Framework

This section summarizes the Federal and State regulatory requirements for air emissions that the SJRPP must meet. Also included is a summary of air emission regulations which would have to be met for Alternatives 1 through 4.

3.1.4.1 SJRPP

Federal Regulatory Requirements

The SJRPP facility will have to meet two major Federal requirements: National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD). The NAAQS establishes a limit for air quality degradation in areas of the United States. The PSD program establishes an amount of increase (increment) over a baseline level above which a new industry may not deteriorate air quality.

The 1970 Clean Air Act Amendments (CAAA) required the Federal government to set standards for ambient air quality for the principal types of pollutants (criteria pollutants) and the levels of each that should not be exceeded for the protection of public health and welfare (Table 3.1-1). In areas where the air quality does not meet these standards (non-attainment), new pollution sources are restricted through the requirements of emission offsets. Prior to development of a significant contributor of the non-attainment pollutant in or near a non-attainment area, an equal or greater reduction of that pollutant from another source in the area must be secured. This generally precludes the development of major industries in a non-attainment area due to the expense of obtaining the required emissions offset.

In areas with air quality cleaner than the NAAQS, PSD applies. PSD restricts the amount of air quality degradation in an area to a specific amount (increment). PSD applies to sulfur dioxide (SO_2) and particulates (TSP). The amount of incremental increase in SO_2 or TSP levels depends on the type of area affected (Table 3.1-2). In Class I areas, which are predominately large national parks, the increment is very small. A moderate increase is allowed in Class II areas, while the greatest amount of increase is allowed in Class III areas. Presently there are no designated Class III areas.

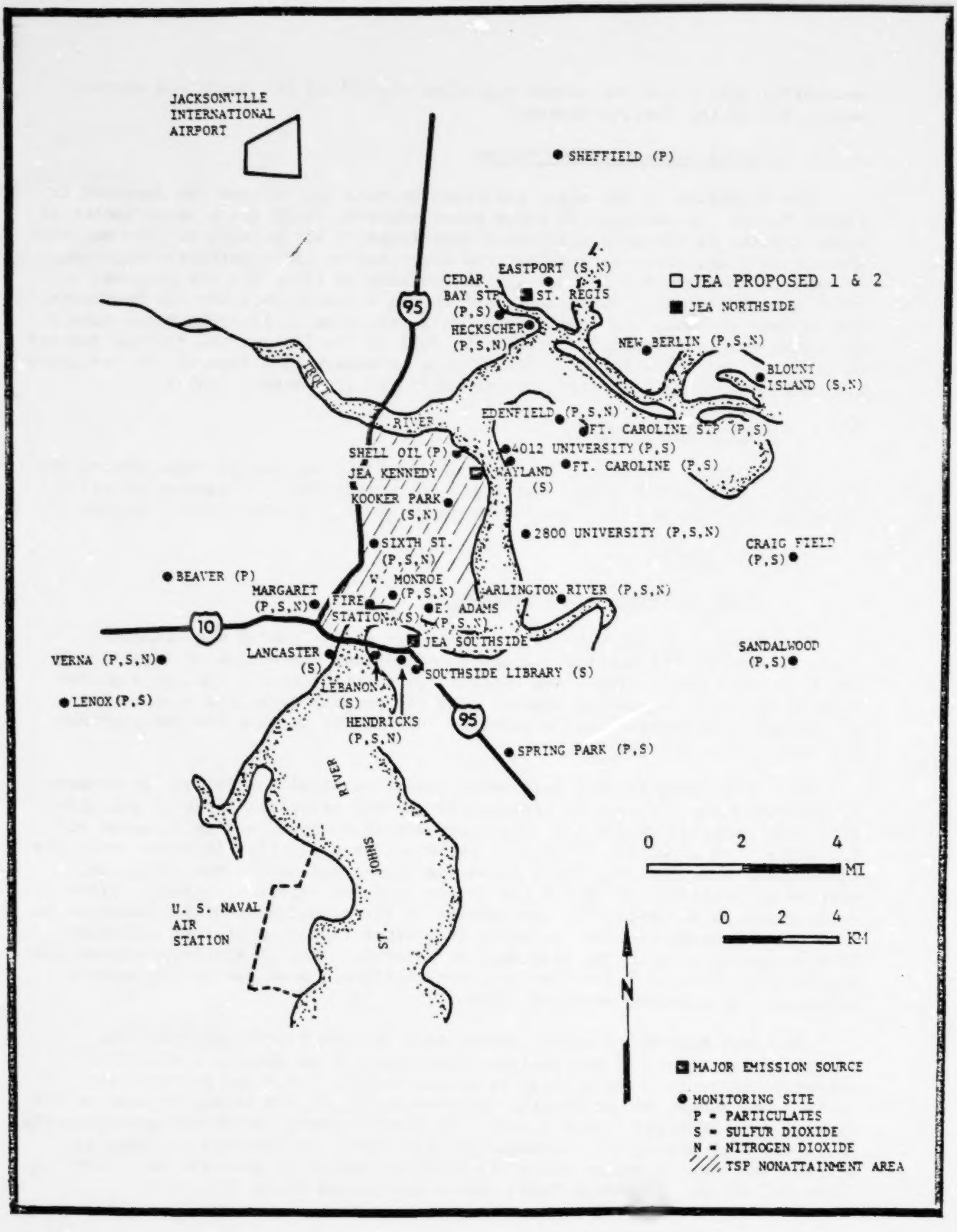

JACKSONVILLE INTERNATIONAL AIRPORT
SHEFFIELD (P)
EASTPORT (S,N)
CEDAR BAY STP (P,S)
ST. REGIS
HECKSCHER (P,S,N)
□ JEA PROPOSED 1 & 2
■ JEA NORTHSIDE
NEW BERLIN (P,S,N)
BLOUNT ISLAND (S,N)
TROUT
RIVER
EDENFIELD (P,S,N)
FT. CAROLINE STP (P,S)
SHELL OIL (P)
4012 UNIVERSITY (P,S)
FT. CAROLINE (P,S)
JEA KENNEDY
WAYLAND (S)
KOOKER PARK (S,N)
2800 UNIVERSITY (P,S,N)
CRAIG FIELD (P,S)
SIXTH ST. (P,S,N)
BEAVER (P)
MARGARET (P,S,N)
W. MONROE (P,S,N)
FIRE STATION (S)
E. ADAMS (P,S,N)
ARLINGTON RIVER (P,S,N)
JEA SOUTHSIDE
SANDALWOOD (P,S)
VERNA (P,S,N)
LANCASTER (S)
LEBANON (S)
SOUTHSIDE LIBRARY (S)
LENOX (P,S)
HENDRICKS (P,S,N)
SPRING PARK (P,S)
95
10
RIVER
JOHNS
ST.
U. S. NAVAL AIR STATION
0 2 4 MI
0 2 4 KM
N
■ MAJOR EMISSION SOURCE
● MONITORING SITE
P = PARTICULATES
S = SULFUR DIOXIDE
N = NITROGEN DIOXIDE
▨ TSP NONATTAINMENT AREA

Figure 3.1-2. Locations of major emission sources and monitoring sites in the Jacksonville area (JEA/FP&L 1981a).

Table 3.1-1. Florida and National Ambient Air Quality Standards (JEA/FP&L 1981a).

Pollutant	Averaging Time	NAAQS Primary Standard (Health)	NAAQS Secondary Stardards (Welfare, Materials)	FAAQS
Particulates	Annual	75 ug/m³	60 ug/m³	60 ug/m³
	24-hour	260 ug/m³	150 ug/m³	150 ug/m³
Sulfur dioxide	24-hour	80 ug/m³		260 ug/m³
	24-hour			365 ug/m³
	3-hour		1,300 ug/m³	1,300 ug/m³
	Annual			60 ug/m³
Carbon monoxide	8-hour	10 mg/m³	same as Primary	10 mg/m³
	1-hour	40 mg/m³		40 mg/m³
Hydrocarbons (nonmethane)	3-hour (6-9 am)	160 ug/m³	same as Primary	160 ug/m³
Nitrogen dioxide	annual	100 ug/m³	same as Primary	100 ug/m³
Ozone	1-hour	240 ug/m³	same as Primary	-
Lead	3-month	1.5 ug/m³		1.5 ug/m³

Table 3.1-2. Prevention of Significant Deterioration permitted increments (Allowed increase over baseline concentration is ug/m³) (USEPA 1979).

		Class I	Class II	Class III
SO_2	Annual	2	20	40
	24-hour[a]	8	91	182
	3-hour[a]	25	512	700
TSP[b]	Annual	5	19	37
	24-hour[a]	10	37	75

[a] All 24-hour and 3-hour values may be exceeded once per year.

[b] TSP is total suspended particulate.

Two additional Federal regulations associated with PSD include the New Source Performance Standards (NSPS) and Best Available Control Technology (BACT). Fossil fuel-fired steam generating units of more than 250 MMBtu/hr of heat input produce three types of emissions for which the USEPA has established NSPS [44 FR (113) 3357933624, June 11, 1979]. The applicable NSPS for these pollutants from coal-fired units are as follows:

- Particulate Matter - 0.03 lb/MMBtu heat input and 20% opacity based upon a six minute average.
- Sulfur Dioxide - 1.2 lb/MMBtu heat input and a 90% reduction in potential sulfur dioxide emissions is required at all times except when atmospheric emissions are less than 0.60 lb/MMBtu heat input. When sulfur dioxide emissions are less than 0.60 lb/MMBtu heat input, a 70% reduction in potential emissions is required. Compliance with the emission limit and percent reduction requirements is determined by continuous monitoring to obtain a 30-day rolling average.
- Nitrogen Oxides - 0.6 lb/MMBtu heat input for bituminous coal and a 65% reduction in potential nitrogen oxide emissions based upon a 30-day rolling average expressed as nitrogen dioxide. The percent reduction is not controlling as USEPA has determined that compliance with the emission limitation will assure compliance with the percent reduction requirement.

In addition to these requirements, the Clean Air Act as amended in 1977 and the implementing PSD regulations require a case-by-case evaluation of BACT for projects the size of SJRPP. BACT is defined as follows in the Federal regulations:

> "Best available control technology means an emission limitation (including a viable emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any proposed major stationary source or major modification, which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques, for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR Part 60 and Part 61"

State Regulatory Requirement

The Florida rules and regulations pertaining to air quality are similar to the Federal regulations. The Florida Air Quality Regulations are defined in the Florida Administrative Code, Chapter 17-2, and administered by the FDER. The primary difference between the Federal requirements and Florida's requirements is in the NSPS. Florida's NSPS are as follows:

• Particulate Matter	0.1 lb/MMBtu, two-hour average and 20% opacity.
• Sulfur Dioxide	1.2 lb/MMBtu, with no percent reduction requirement, maximum two-hour average.
• Nitrogen Oxides	0.7 lb/MMBtu, maximum two-hour average.

3.1.4.2 Other Alternatives

The refuse-fired boilers, COM conversions, and coal conversions included in Alternatives 1 through 4 will either be regulated by the requirements under provisions of PSD, the Florida State Implementation Plan (SIP), or the NAAQS. Refuse-fired plants with SO_2 or TSP emissions greater than 250 tons/year and COM conversions with emissions of SO_2 or TSP greater than 100 tons/year will be subject to the PSD requirements discussed in Section 3.1.4.1. Refuse-fired plants and COM conversions with emissions lower than the above limits will be subject to the Florida SIP. Coal conversions are now exempt from PSD and NSPS if the existing facility is deemed currently capable of converting to coal and would therefore be controlled by the Florida SIP. Facilities which are not currently coal capable would be deemed major modifications and subject to PSD if converted to coal and the conversion resulted in an increase in SO_2 or TSP emissions of 100 tons/year or more. A provision now being considered for enactment as part of the 1981 Clean Air Act Amendments would exempt all coal conversions from the provisions of PSD. Under no circumstances would an alternative be allowed which would cause a violation of the NAAQS.

3.2 SURFACE WATER RESOURCES

This section describes the existing surface water resources which may be affected by the proposed SJRPP and the proposed alternatives. Detailed information regarding surface water resources is presented in Appendix L. The waters of concern include the St. Johns River near the proposed SJRPP site which is adjacent to the Northside Generating Station (NGS) in Jacksonville, Florida; the tributaries to the St. Johns River local to the SJRPP site; and the St. Johns River near the FP&L Sanford Plant near Sanford, Florida. All of these waters have been classified by the State of Florida as Class III waters designated for fish and wildlife propagation (Florida Administrative Code, Chapter 17-3.161). The St. Johns River at the SJRPP/NGS sites is marine in character and the Class III marine water quality criteria apply (Table 3.2-1). The other waters under study are fresh waters and Class III freshwater quality criteria apply (Table 3.2-1). Where a discharge into these waters occurs, the water quality criteria apply beyond a designated mixing zone. In addition, at the point of discharge (POD) the concentration of any toxic pollutant must be less than to the 96-hour LC_{50} for a species significant to the indigenous

Table 3.2-1. Florida water quality criteria for Class III predominantly marine and fresh waters[1] (Florida Administrative Code, Chapter 17-3, 1979).

Parameter	Allowable Level
Aluminum	1.5 mg/l (no standard)
Antimony	0.2 mg/l (no standard)
Arsenic	0.05 mg/l (no standard)
Beryllium	1.10 mg/l
Bromates	100 mg/l (no standard)
Bromine (molecular)	0.1 mg/l (no standard)
Cadmium	5.0 ug/l (no standard)
Chlorides	5.0 ug/l (0.8 ug/l) 10% increase above ground background levels
Chlorine (total residual)	0.01 mg/l
Chromium, hexavalent	0.50 mg/l (in effluent)
total	1.0 mg/l (in effluent)
total	0.05 mg/l (after mixing)
Copper	0.015 mg/l (0.03 mg/l)
Cyanide	5.0 ug/l
Fluorides	5.0 mg/l (no standard)
Iron	0.3 mg/l (1.0 mg/l)
Lead	0.05 mg/l (0.03 mg/l)
Mercury	0.1 ug/l (0.2 ug/l)
Nickel	0.1 mg/l
Phosphorus (elemental)	0.1 ug/l (no standard)
Polychlorinated Biphenyls	0.001 ug/l
Selenium	0.025 mg/l
Silver	0.05 ug/l (0.07 ug/l)
Zinc	1 mg/l (0.03 mg/l)
BOD	Appropriate D.O must be maintained
Detergents	0.5 mg/l
Dissolved gases	110% of saturation value at the existing atmospheric and hydrostatic pressures
Dissolved oxygen	Minimum 4 mg/l; 24 hr. avg. 5 mg/l
Oil & Grease (dissolved and emulsified)	5.0 mg/l
Turbidity	50 Jackson units above background levels
Fecal coliform	200/100 ml (monthly avg) 800/100 ml (daily max.)
Total coliform	1000/100 ml (monthly avg.) 2400/100 ml (maximum)
pH	6.5 - 8.5 (also the discharge may not cause the ambient pH to vary by more than one pH unit)

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[1] Where a freshwater criterion differs from a marine criterion, the freshwater criterion is given in parentheses.

aquatic community. Florida statutes allow variances or other relief from water quality criteria if ambient levels of constituents in State waters exceed specified water quality standards (FAC Chapter 17-3.031). This allowance is of significance because JEA and FP&L have applied to FDER for a variance for the discharge from the SJRPP for several parameters (JEA/FP&L 1981c).

3.2.1 St. Johns River at Jacksonville

At the SJRPP/NGS sites, the St. Johns River is divided into two segments by Blount Island. The old natural channel curves north of the Island while the Fulton-Dame Point Cutoff, dredged to straighten this section of the St. Johns River, flows south of Blount Island and contains the main navigational channel of the River. The proposed coal unloading facility is to be located on the south end of Blount Island on the Fulton-Dame Point Cutoff.

The St. Johns River in the vicinity of the proposed project is greatly influenced by the Atlantic Ocean. Due to the tidal influence, currents are highly varied and flow in the St. Johns River at Blount Island changes direction on an average of four times per day (USCOE 1980b). Current profiles were measured in the area of the NGS discharge in the old natural channel and in the Fulton-Dame Point Cutoff on 16-17 October 1980. These measurements indicated a fairly uniform current velocity across the River in both channels (JEA/FP&L 1981a). Approximately 50% of the total flow of the St. Johns River passes through the Fulton-Dame Point Cutoff during flood tide and about 66% passes during ebb tide. The remainder passes through the old natural channel north of Blount Island (JEA/FP&L 1981a). The estimated freshwater flow in the St. Johns River at Blount Island is approximately 9,300 cubic feet per second (cfs).

Data collected during the pre-application water quality monitoring program from November 1979 to October 1980 (Table 3.2-2) showed that for ambient conditions, concentrations of the following pollutants were found to exceed the State water quality standards for Class III marine waters (JEA/FP&L 1981a):

- Aluminum
- Total residual chlorine
- Copper
- Total coliform
- Cyanide
- Iron
- Mercury
- Oil and grease
- Silver

Based on tests performed on the surface waters of the Fulton-Dame Point Cutoff as part of the pre-application monitoring, water quality met Class III marine water quality standards for all parameters except the following (JEA/FP&L 1981a):

- Cadmium
- Lead
- Mercury

Table 3.2-2. Water quality of the St. Johns River in the Blount Island Channel (November 1979-October 1980) (JEA/FP&L 1981b).

Parameter	Concentration Mean	Concentration Maximum
Chlorides, mg/l	13,000	20,400
Sulfates, mg/l	1,740	2,600
Calcium, mg/l	272	395
Iron, mg/l	0.801	2.7
Magnesium, mg/l	843	1,200
Potassium, mg/l	267	365
Sodium, mg/l	7,150	9,150
Cyanide, ug/l	10	90
Aluminum, ug/l	488	3,630
Antimony, ug/l	0.19	0.95
Arsenic, ug/l	0.69	1.0
Beryllium, ug/l	0.09	0.19
Boron, ug/l	3.11	4.7
Cadmium, ug/l	0.29	2.2
Chromium, ug/l	1.59	5.0
Copper, ug/l	69.5	275
Lead, ug/l	0.37	10
Manganese, ug/l	27.3	90
Mercury, ug/l	0.24	0.6
Nickel, ug/l	3.34	16.5
Selenium, ug/l	0.5	0.75
Silver, ug/l	0.16	0.35
Zinc, ug/l	46.2	149

- Silver
- Total residual chlorine
- Copper (equal to standard)

Elutriate tests were performed on four sediment core samples taken in the proposed dredge area for the ocean vessel coal unloading facility. The following water quality parameters were at levels in the elutriate which exceeded Class III marine water quality standards (JEA/FP&L 1981a):

- Antimony
- Cadmium
- Copper
- Lead
- Mercury
- Oil and grease
- Silver

The analytical method used to measure the level of cyanide present in the elutriate had a detection limit (0.010 mg/l) which was above the allowable level (0.005 mg/l) of cyanide. In addition, since the cyanide concentration violates the allowable level in the Blount Island Channel, a similar concentration in the elutriate of the Fulton-Dame Point Cutoff must be considered highly probable.

3.2.2 St. Johns River at Sanford

Several of the proposed alternatives involve changes in the operation at the FP&L plant near Sanford, Florida. The Sanford Plant is located on the St. Johns River just downstream (west) of Lake Monroe. The Lake is formed by a wide area in the St. Johns River and covers 9,406 acres. The Lake is relatively shallow (4 to 7 feet deep) except for a 12 foot deep channel which is maintained by the USCOE. The St. Johns River is affected tidally up to Lake George, and during drought and high tide conditions the tidal effects occur as far upstream as Lake Monroe (FDER 1979).

The St. Johns River drains an area of approximately 2,500 mi^2 above Sanford. Throughout much of its upper reaches it is flat, marshy, and meandering with a low, marshy floodplain. The River is fed by a number of tributaries upstream of the Sanford area, from springs along its length, and from large volumes of water discharged from the Floridan Aquifer (Clark, Dietz and Associates, Inc. 1977). The estimated 7-day, 10-year low flow is approximately 220 cfs at Sanford.

The St. Johns River at Sanford is a moderately polluted area with total phosphorus concentrations above natural levels and BOD above State standards (FDER 1980). Wastewater discharges reach the St. Johns River via the Econlockhatchee River (from east Orlando), via Lake Jessup (from Winter Park, Maitland, and Castelberry), and directly to Lake Monroe (from Sanford). Lake Monroe is a highly eutrophic lake. Nonpoint sources from urban areas increase nutrient concentrations, decrease water clarity, and increase phytoplankton activity and coliform bacteria levels (FDER 1979). Metals concentrations in the St. Johns River near Sanford are within State water quality standards in general (Table 3.2-3). Frequent violations have occurred, however, with respect to cadmium, chromium, copper, lead, and zinc.

3.2.3 Local Tributaries and Site Hydrologic Characteristics (SJRPP/NGS)

The proposed SJRPP site is located immediately north and northeast of the NGS. Southeast of the site is Browns Creek, and east and northeast of the site is Clapboard Creek. Southwest of the site and passing through the NGS site is San Carlos Creek. Nicholas Creek joins San Carlos Creek at the confluence with the St. Johns River approximately 460 m (1,500 ft) upstream from the NGS discharge. These four creeks drain the Clapboard Creek watershed (USCOE 1980). To the west of the SJRPP site is the Dunn Creek watershed. Small tributaries to Dunn Creek include Caney Branch and Rushing Branch which are northwest of the site and Terrapin Creek which drains the area immediately to the west of the site.

On the SJRPP site (Figure 3.2-1) there are three unnamed tributaries to Browns Creek. One tributary (B, Figure 3.2-1) drains an old bayhead swamp which covers approximately 20 acres in the southern portion of the site. The other two tributaries (C and D, Figure 3.2-1) drain the eastern and northern portions of the site. The City of Jacksonville's North Landfill drains to Tributary C. A saltwater marsh exists at the outlet to tributaries C and D and in the northeast portion of the site a swamp drains into Clapboard Creek. North of Island Drive, which runs east and west through the site, at the headwaters to Tributary C is a large freshwater swamp and a series of cypress dome swamps.

As part of the pre-application monitoring program, six locations (Figure 3.2-1) within and adjacent to the SJRPP site were sampled for water quality. Violations of water quality criteria for Class III freshwaters were observed at one or more locations for fecal and total coliform bacteria and alkalinity. No other violations of water quality criteria were observed.

3.2.4 Surface Water Uses

The St. Johns River is under the jurisdiction of the St. Johns River Water Management District (SJRWMD). The SJRWMD has formulated policies to ensure the continued adequate supply of surface water for various uses including public, industrial and power generation, irrigation, rural, and recreational (SJRWMD 1977 in JEA/FP&L 1981a).

Primary surface water uses in the site vicinity include recreation and navigation. Population growth in the region as well as increased leisure time has resulted in a high demand for recreational uses. The St. Johns River is a prime recreational resource. Boating, water skiing, and fishing are enjoyed by both residents and tourists in the area.' The St. Johns River is also maintained for commercial navigation serving domestic and foreign cargo lines at the Port of Jacksonville including Blount Island, the Port of Sanford, and other ports between.

Table 3.2-3. Storage and retrieval (STORET) summary for the St. Johns River near Sanford at US Highway 17/92 (1968-1981) (USEPA 1981).

Parameter	Units	Number of Observations	Mean	Maximum	Minimum	Standards
Temperature	Degrees C	116	23.3	33.0	9.8	-
Turbidity	JTU	113	31.7	105.0	3.0	-
Transparency (Secchi)	Meters	54	0.57	0.90	0.30	-
Conductance at 25° C	Micromhos	105	1,190	3,400	417	-
Dissolved Oxygen	Mg/l	88	7.25	16.5	2.1	-
BOD (5 day)	mg/l	69	4.10	16.00	0.30	-
pH	Standard units	123	7.97	9.90	6.89	6.5-8.
Alkalinity	mg/l as $CaCO_3$	122	57.2	126.0	22.0	20.0
Acidity	mg/l as $CaCO_3$	77	2.47	18.00	0.00	-
Organic Nitrogen	mg/l	89	1.56	3.52	0.30	-
Nitrate Nitrogen	mg/l	55	2.41	50.00	0.00	-
Kjeldahl Nitrogen	mg/l	37	1.53	2.37	0.54	-
Phosphate	mg/l	34	0.77	2.40	0.04	-
Orthophosphate	mg/l	37	9.53	340.00	0.01	-
Organic Carbon	mg/l	75	21.9	38.0	2.0	-
Chloride	mg/l	112	288	726	69	-
Sulfate	mg/l	88	64	194	18	-
Fluoride	mg/l	23	0.14	0.26	0.02	10.00
Arsenic	mg/l	1	0.15	-	-	0.05

Table 3.2-3. Storage and retrieval (STORET) summary for the St. Johns River near Sanford at US Highway 17/92 (1968-1981) (USEPA 1981)(concluded).

Parameter	Units	Number of Observations	Mean	Maximum	Minimum	Standards
Cadmium	ug/l	14	2.7	10.0	0.5	0.8
Chromium	ug/l	6	60	100	10	50
Copper	ug/l	14	38.2	140.0	0.0	30.0
Iron	ug/l	50	250	500	50	1,000
Lead	ug/l	39	16.4	60.0	5.0	30.0
Manganese	ug/l	1	46.0	-	-	-
Zinc	ug/l	39	107.0	500.0	10.0	30.0
Mercury	ug/l	3	0.13	0.20	0.10	0.20
Nickel	ug/l	0	-	-	-	100

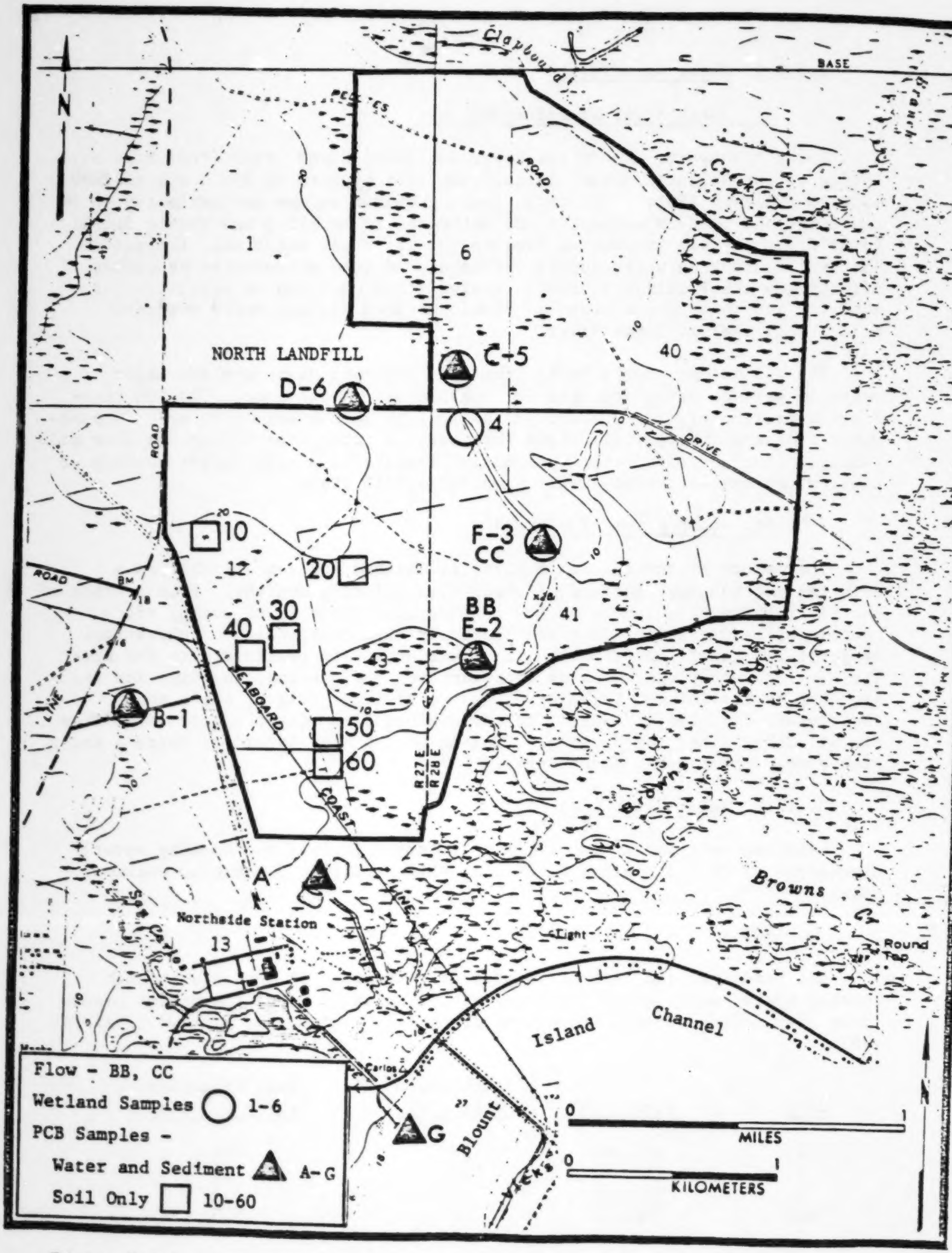

N
Clapboard
BASE
Branch
Creek
ROAD
1
6
NORTH LANDFILL
C-5
D-6
4
40
DRIVE
ROAD
10
20
12
F-3
CC
30
40
BB
E-2
41
43
B-1
LINE
SEABOARD
COAST
LINE
50
60
R27E
R28E
Browns
Browns
Cr
A
Northside Station
13
Light
Round Top
Island
Channel
Blount
Vicks
G
Flow - BB, CC
Wetland Samples ○ 1-6
PCB Samples -
Water and Sediment ▲ A-G
Soil Only ☐ 10-60
0
1
MILES
0
1
KILOMETERS

Figure 3.2-1. Water quality and PCB sampling locations for waterbodies in the SJRPP site area (JEA/FP&L 1981a).

3.2.4.1 Water Withdrawal

St. Johns River at Jacksonville

Total freshwater use in the Lower St. Johns River Basin (from Lake St. George to the Atlantic Ocean) in 1975 was estimated to be 398.8 mgd (SJRWMD 1977 in JEA/FP&L 1981a). Of this total, groundwater use was estimated to be 213.2 mgd and surface water use was estimated to be 185.6 mgd (Table 3.2-4). In 1975, nearly all freshwater consumption for rural water use, irrigation, and public drinking water supply was developed from groundwater resources, principally the Floridan Aquifer. A significant portion of water use for industry and power generation was developed from surface water sources, principally the St. Johns River.

The NGS and St. Regis Paper Company's Eastport plant are the major users of surface water from the St. Johns River in the area. The NGS withdraws approximately 216 mgd and St. Regis uses approximately 60 mgd. Groundwater uses are substantially less than surface water uses within the five mile radius, although groundwater consumption represents a significant portion of total water use at the St. Regis plant (JEA/FP&L 1981a).

St. Johns River at Sanford

The waters of the St. Johns River at Sanford are not suitable as a drinking water supply because of their high chloride content. This portion of the River has a brownish color due to extensive draining of swampy areas containing tannic acid. Silt and turbidity also contribute to coloration. Agricultural runoff contributes silt, nutrients, and pesticides to the River. The River provides recreational opportunities for fishing, hunting, and boating, but is little used for body contact activities (Clark, Dietz and Associates, Inc. 1977). Unit 3 of the Sanford Plant makes use of water from the St. Johns River for cooling. Cooling pond makeup water for Units 4 and 5 also comes from the St. Johns River.

3.2.4.2 Water Discharges

Existing wastewater discharges of interest include the cooling water discharges of FP&L's Sanford Plant and JEA's Northside Generating Station (NGS).

NGS

The Blount Island Channel is presently affected by the once-through cooling system serving the three generating units at NGS. The design conditions for cooling these units operating at full load are as follows (JEA/FP&L 1981a):

Unit	Flow (gpm)	Temperature Rise (°F)	Heat Rejection Rate - 10^9 Btu/hr
1	140,000	19	1.3
2	140,000	19	1.3
3	280,000	19	2.7
All	560,000	19	5.3

Table 3.2-4. Freshwater use and projections for the Lower St. Johns River Basin[a], 1975-2020 (SJRWMD 1977 in JEA/FP&L 1981a).

Water Use Category	Groundwater Withdrawn(mgd)				Surface Water (mgd)			
	1975	1980	2000	2020	1975	1980	2000	2020
Public	65.9	82	145	214	--	--	--	--
Industrial	62.1	64	77	92	25.3	26	31	38
Irrigation	49.3	54	68	74	--	--	--	--
Power Generation	2.3	2	2	2	160.0	160.0	160.0	160.0
Rural	33.6	35	38	35	0.3	0.3	0.3	0.3
Basin Total	213.2	237	330	417	185.6	186.3	191.3	198.3

---

[a] River mouth to Lake St. George

[b] Note that this does not include salt water use

Circulating water enters the NGS intake flume between elevations (-)9.3 and (-)20.0 feet MSL and is conveyed by the 25 foot wide and approximately 16 foot deep flume to the intake basin. The circulating water pumps for each unit take suction from this basin, pump the water through each unit's condenser, and discharge it to the discharge channel. The heated water flows from the discharge channel by gravity through the 196-inch diameter discharge pipe, from which it branches to the two 120-inch diameter discharge openings in the Blount Island Channel (JEA/FP&L 1981a).

The JEA was issued a National Pollutant Discharge Elimination System (NPDES) permit for Units 1, 2, and 3 of the NGS on 17 February 1977 (Permit No. FL0001031). Effluent limitations and monitoring requirements were established for once-through cooling water, low volume waste sources, boiler blowdown from the generating units, and point source runoff from construction. Once-through cooling water is limited to a 24-hour maximum average temperature of 40° C (104° F) and a 10.6° C (19° F) temperature rise above ambient conditions. Minimum temperature rises of 8.3° C (15° F) are predicted. The NGS NPDES permit limits both the maximum centerline length and area enclosed within the 2° F (above ambient) isotherm of the thermal plume at a depth of one meter. These limits are 5,400 feet and 102 acres, respectively. The extent of the thermal plume, as defined by the 2° F (above ambient) isotherm, is much smaller than allowed by the NPDES permit under both average and extreme conditions. The thermal plume does not significantly influence water temperatures at locations outside the initial mixing area (JEA/FP&L 1981a).

Free available chlorine in the once-through cooling water discharge must not exceed an average concentration of 0.2 mg/l and a maximum instantaneous concentration of 0.5 mg/l at the outlet corresponding to an individual unit. Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than two hours in any one day and then not more than one unit may discharge free available or total residual chlorine at any one time.

When all units are functioning, the NGS discharges approximately 560,000 gallons per minute (gpm) of once-through cooling water to the St. Johns River. Chlorine is added to the cooling water to prevent biological fouling. The existing NPDES Permit for NGS limits the concentration of free available chlorine (FAC) in the cooling water discharge to 0.2 mg/l on the average and 0.5 mg/l as an instantaneous maximum. All plant wastewater discharges from plant operations are directed through treatment plants to percolation ponds. An unquantified amount of pollutants seeps from the percolation ponds to Browns Creek and the St. Johns River.

Sanford Plant

The FP&L Sanford Plant is located on the north bank of the St. Johns River west of Lake Monroe. The Plant's three steam electric generating units have the following characteristics (FP&L 1976):

Unit Number	New Summer Peak Capability (MW)	Flow Rate per Minute	
		Gallons	Liters
3	154	116,000	440,000
4	382	256,000	969,000
5	382	256,000	969,000

Units 1 and 2 were retired from service in 1964. Unit 3 draws condenser cooling water from the St. Johns River through an intake canal. Debris is removed from the intake water by a set of traveling screens. After passage through the condenser system, water is released into a discharge canal which empties into the St. Johns River. The maximum recorded temperature rise in the water across the condensers at peak operating load was 8.3° C (15° F) (FP&L 1976). Units 4 and 5 use a 1,100 acre reservoir for off-stream cooling (Figure 3.2-2). Makeup water for this reservoir is pumped from the intake canal. No cooling water discharge to the St. Johns River has occured from these two units. The alternatives under consideration involve changes to Units 4 and 5 with no changes to Unit 3.

Wastewater which could potentially be discharged to the St. Johns River includes boiler blowdown (100 gpm), low volume waste sources (194 gpm), storm water discharged from non-equipment drains (variable flows), and cooling pond discharge (emergency use). The effluent limits for these wastewaters established in the Sanford Plant NPDES permit issued in 1976 are as follows (USEPA 1976):

Parameter	Boiler Blowdown	Storm Drains	Low Volume Sources
Oil and Grease	15	N/A	15
Total Suspended Solids	30	N/A	30
Total Copper	1.0	--	--
Total Iron	1.0	--	--
pH (Standard Units)	--	--	--

N/A - not applicable

No other discharge quality data were available for the Sanford Plant.

3.3 GROUNDWATER RESOURCES

This section summarizes the groundwater resources in the Jacksonville and Sanford, Florida areas. Detailed information on groundwater resources can be found in Appendix M.

3.3.1 Regional Groundwater Systems

Peninsular Florida's sedimentary rock sequences consist of about 8,000 feet of marine, littoral, and terrestrial deposits. The Paleozoic and Mesozoic sequences comprise about 5,000 feet while Cenozoic strata extend from the

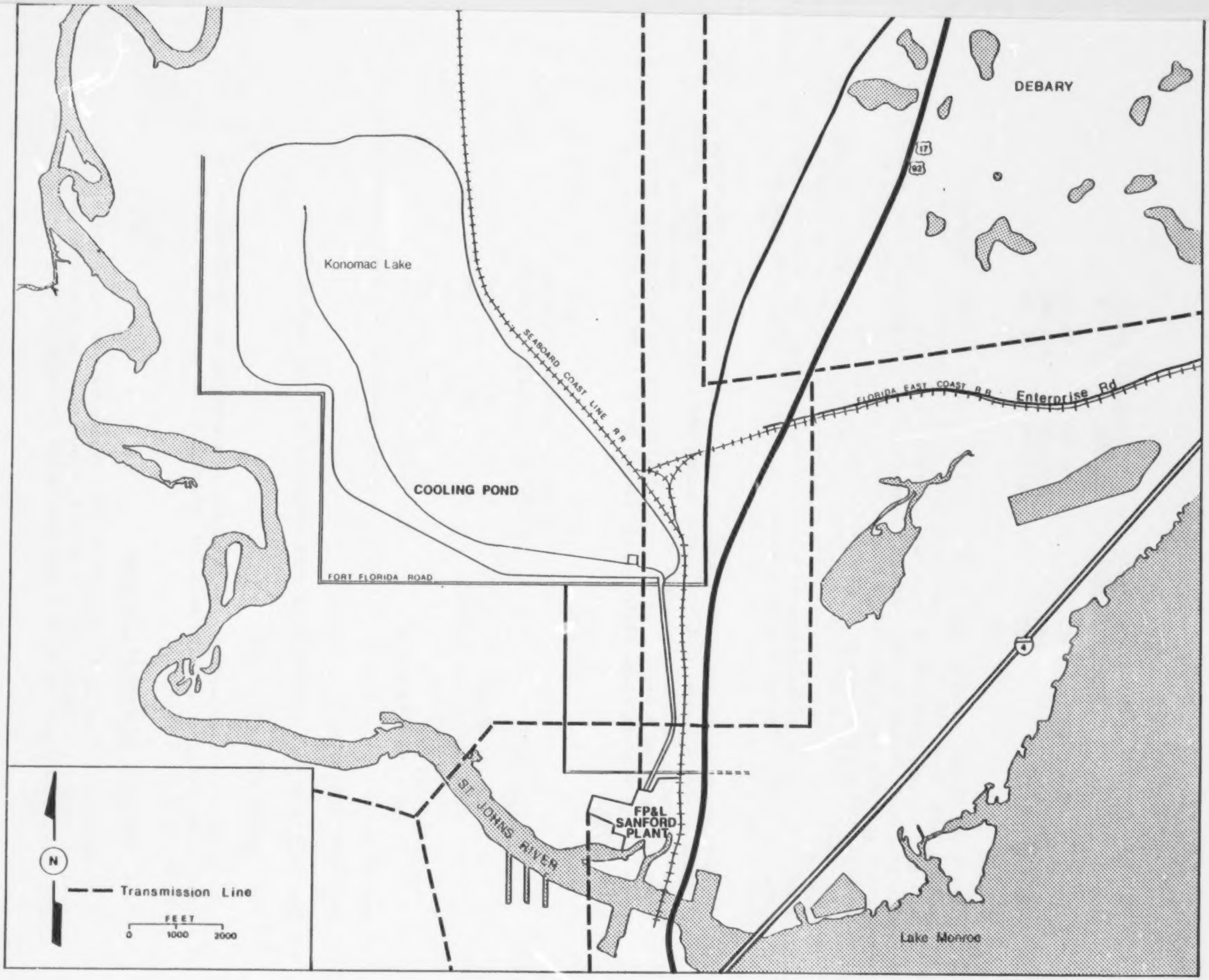

DEBARY
17
92
Konomac Lake
SEABOARD COAST LINE R.R.
FLORIDA EAST COAST R.R.
Enterprise Rd
COOLING POND
FORT FLORIDA ROAD
4
FP&L
SANFORD
PLANT
ST JOHNS RIVER
Lake Monroe
N
Transmission Line
FEET
0
1000
2000

Figure 3.2-2. Water resources in the vicinity of FP&L's Sanford Plant.

ground surface to a depth of approximately 3,000 feet. The Cenozoic sediments include the following geologic and hydrologic formations pertinent to this project (JEA/FP&L 1981a):

- The Cedar Keys Limestone which is the lowest confining unit (aquiclude) for the Floridan Aquifer;
- The Floridan Aquifer which includes the Lake City Limestone, the Avon Park Limestone, and the Ocala Group;
- The Hawthorn Formation which is the upper confining unit for the Floridan Aquifer; and
- The Choctawhatchee Formation.

The post-Miocene sediments in peninsular Florida are characterized by a complex series of unconsolidated sands, clays, and shell. Where present, undifferentiated upper Miocene and Pliocene sediments consist of poorly sorted sands, gray clays, and shell beds with abundant mollusks (JEA/FP&L 1981a). Pleistocene and Holocene sediments comprise the upper 20 to 90 feet in northern peninsular Florida. These are yellow to tan sands with scattered thin clay layers. These sediments contain a second important source of fresh water known as the shallow aquifer system which lies between the ground surface and a depth of approximately 100 feet.

3.3.1.1 Groundwater Conditions at the SJRPP and NGS Sites

The proposed SJRPP site is adjacent to the existing NGS site in Duval County, Florida. Both sites are underlain by the shallow aquifer system and the deeper Floridan Aquifer. The Floridan Aquifer lies at a depth of between 460 and 600 feet and consists of two distinctly separate zones referred to as the upper and lower permeable zones (Franks and Phelps 1979). The upper permeable zone is the principal source of fresh water in Duval County. Wells penetrating the full thickness of this zone typically yield 1,000 to 2,000 gpm by artesian flow (Leve 1966 in JEA/FP&L 1981a). Development of the lower permeable zone has been limited since adequate yields of fresh water are obtained from the upper permeable zone. Recharge to the Floridan Aquifer occurs in western Putnam and Clay Counties and eastern Alachua and Bradford Counties. Recharge occurs where rain and surface water enter the Floridan Aquifer through breaches in overlying aquicludes (Leve 1966 in JEA/FP&L 1981a). Groundwater movement is from these recharge areas to discharge areas to the north and east.

Two shallow aquifers underlie the SJRPP/NGS site, the water table aquifer (-20 to -30 feet) and the shallow rock aquifer (-60 to -90 feet). They are collectively referred to as the shallow aquifer system. The shallow aquifer produces water that is generally acceptable for most domestic, commercial, and industrial uses. Well yields in the shallow aquifer zone are generally less than 100 gpm although yields of up to 200 gpm have been reported (Causey and Phelps 1978 in JEA/FP&L 1981a). Water wells completed in surficial sands (water table aquifer) generally yield less than 10 gpm. One well completed in a shell bed yielded in excess of 40 gpm (Causey and Phelps 1978 in JEA/FP&L

1981a). Recharge to the shallow aquifer system occurs from rainfall and surface water. Movement of groundwater at the SJRPP/NGS sites is typically down gradient toward the marshes on the southeast (Moehle 1981d). The water table aquifer lies from -16 feet to -4 feet below the land surface in these areas.

3.3.1.2 Groundwater Conditions at the Sanford Plant Site

The Sanford Plant site in Volusia County, Florida is also underlain by the Floridan Aquifer and the shallow aquifer system. The Floridan Aquifer in Volusia County consists of limestone the top of which ranges in depth from 40 to 100 feet. Its vertical thickness extends to several thousand feet. It is the principal source of fresh water for Volusia County and is used for irrigation, public water supply, and commercial and industrial purposes. The Floridan Aquifer consists of two zones of fresh water. Recharge occurs principally in the central part of Volusia County and to a lesser degree elsewhere in the County. Recharge occurs whenever the water table stands at a higher elevation than the piezometric surface (Knochenmus and Beard 1971). Groundwater flow is from the recharge areas in the central part of Volusia County to the east, west, and north. The Sanford Plant site is not in the main recharge area of Volusia County.

The shallow aquifer system ranges in thickness from about 25 feet near the Halifax and St. Johns Rivers (Sanford Plant site) to 80 feet in the central part of Volusia county. Recharge is chiefly by rainfall, although a small amount occurs as a result of upward seepage of artesian water from the Floridan Aquifer (Wyrick 1960). The shallow aquifer system serves principally as a recharge zone to the Floridan Aquifer and is rarely used for domestic, commercial, or industrial purposes (Knochenmus and Beard 1971). The water from this aquifer generally has a low mineral content (25 to 50 mg/l) due to the low solubility of the sand. Mineralization is higher in shell beds due to the higher solubility of the shells (Knochenmus and Beard 1971).

3.3.2 Groundwater Use

3.3.2.1 Duval County and the SJRPP and NGS Sites

The Floridan Aquifer is the principal source of fresh water for the Jacksonville area. Users include utilities, private domestic systems, the military, commercial businesses, and industries. A breakdown of groundwater use in 1966 includes the following (Leve and Goolsby 1969 in JEA/FP&L 1981a):

User	Amount (mgd)
Jacksonville municipal water utility	36
Other municipal utilities	3
Non-municipal utilities	22
Private domestic systems	5
Military water systems	6
Industrial and commercial systems	72
Supplemental supplies for surface lakes and ponds	8
Wild wells (uncontrolled discharge)	10

In 1966, an estimated total of 162 million gallons per day (mgd) was being withdrawn from the aquifer (Leve and Goolsby 1969 in JEA/FP&L 1981a). By 1982 groundwater use at the NGS is expected to average approximately 1.1 mgd from four Floridan Aquifer wells completed at approximately 1,100 feet in depth (JEA/FP&L 1981a).

The potentiometric surface for the Floridan Aquifer in Jacksonville (Figure 3.3-1) was observed to be declining at a rate of 0.5 to 2.0 feet per year between the 1940's and 1962 due to increased pumping (Leve 1966 in JEA/FP&L 1981a). Localized depressions have been observed in the vicinity of Eastport and Jacksonville where heavy pumping occurs. The potentiometric surface in the vicinity of the SJRPP appears to be declining at a rate of 0.4 to 0.5 feet per year (JEA/FP&L 1981a). Static water levels at the site were approximately 20 feet above land surface (36 feet above mean sea level).

The shallow aquifer system is an important secondary source of fresh water in Duval County. Approximately 15 of the wells in the vicinity of the SJRPP site are completed in this aquifer (Appendix M, Table 3.1-2). Most wells in the Jacksonville area producing water from the shallow aquifer system have been completed in the "shallow rock zone" located between a 40 and 100 foot depth. Recharge is principally by infiltration of rainfall and percolation from surface water bodies (Snell and Anderson 1970 in JEA/FP&L 1981b). Annual water level fluctuations range from 5 to 20 feet in topographically high regions. Water level extremes over a longer period of record may be considerably greater (Snell and Anderson 1970 in JEA/FP&L 1981a).

3.3.2.2 Volusia County and the Sanford Plant Site

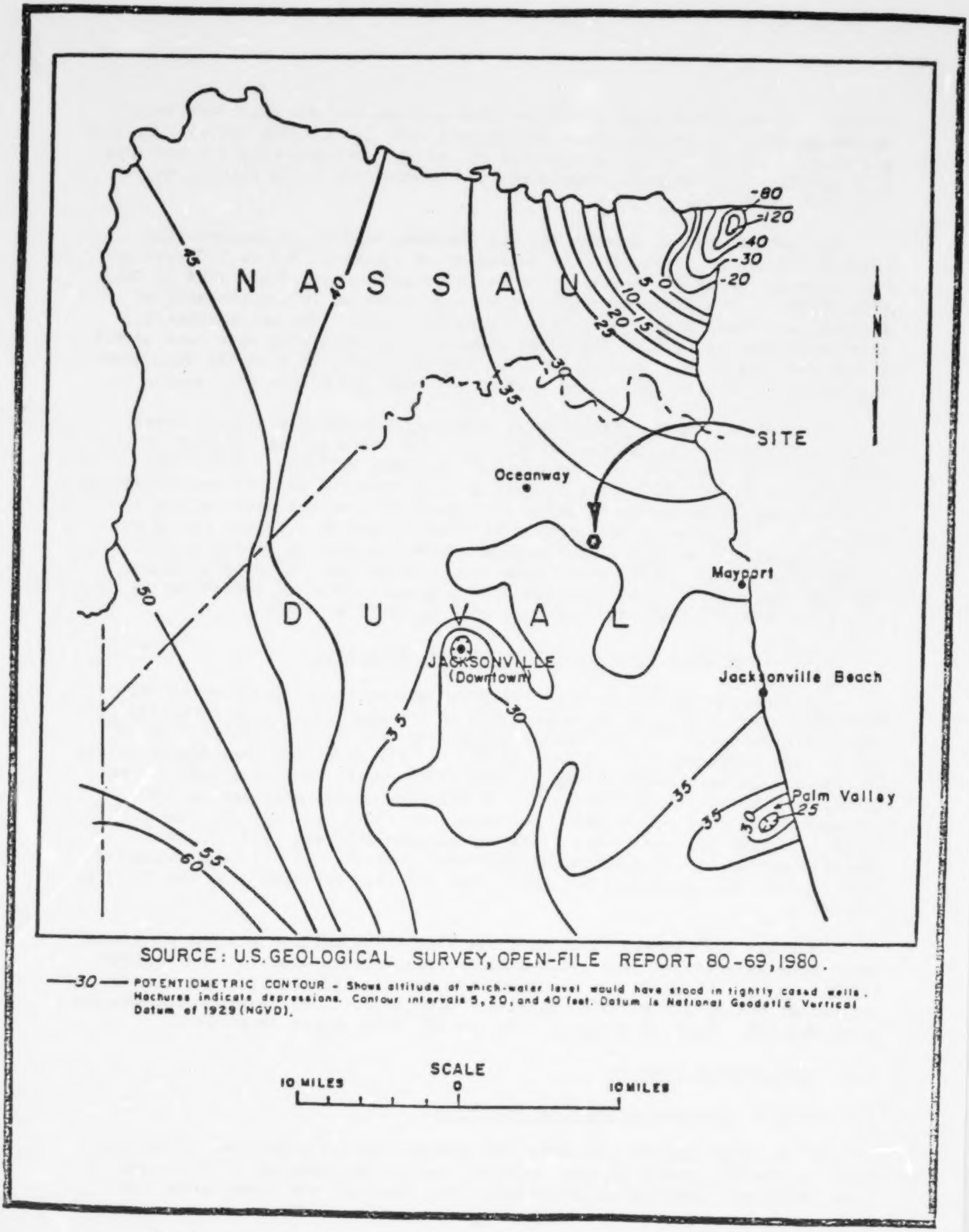
The Floridan Aquifer is also the principal source of fresh water for domestic, commercial, and industrial use in Volusia County. An inventory of groundwater wells in Volusia County bounded by latitudes 28° 50' 50" to 28° 56' 57" and longitudes 81° 15' 42" to 81° 19' 49" indicated that approximately 364 wells have been completed in the Floridan Aquifer (Rutledge 1981). Knochenmus and Beard (1971) indicated that Volusia County water use in 1967 averaged about 25.9 mgd of which the major use (15.8 mgd) was for public supply. During the twenty-year interval between 1950 and 1970, Volusia County's public use of groundwater more than doubled. It has been estimated that 300 mgd were available for public use and that 95% came from the Floridan Aquifer.

Data for the Sanford Plant indicate that 116.8 million gallons of groundwater were used in 1979 and 116.2 million gallons were used in 1980 (SJRWMD 1980). This fresh water was obtained from the Floridan Aquifer and was used for boiler makeup and potable supplies. Most of the cooling water and process water for this plant is obtained from the St. Johns River (FP&L 1976).

3.3.3 Groundwater Quality

3.3.3.1 Groundwater Quality Standards

State water quality standards for groundwater are contained in Florida Rules of the Department of Environmental Regulation, Chapter 17-3.071 and 3.101 which were adopted on 28 October 1970, amended, and approved by the


N A S S A U
D U V A L
N
SITE
Oceanway
Mayport
JACKSONVILLE
(Downtown)
Jacksonville Beach
Palm Valley
-80
-120
-40
-30
-20
0
5
10
15
20
25
30
35
40
45
50
55
60
SCALE
10 MILES
0
10 MILES

SOURCE: U.S. GEOLOGICAL SURVEY, OPEN-FILE REPORT 80-69, 1980.

—30— POTENTIOMETRIC CONTOUR - Shows altitude at which water level would have stood in tightly cased wells. Hachures indicate depressions. Contour intervals 5, 20, and 40 feet. Datum is National Geodetic Vertical Datum of 1929 (NGVD).

Figure 3.3-1. Potentiometric surface map of the Floridan Aquifer near Jacksonville, May 1979 (JEA/FP&L 1981a).

USEPA on 1 March 1979. These standards state that "all groundwater with total dissolved solids levels of less than 10,000 mg/l are classified as Class 1-B." The water quality criteria (Table 3.3-1) for Class 1-B are to be applied except within zones of discharge.

3.3.3.2 Duval County and the SJRPP/NGS Sites

Groundwater from the Floridan Aquifer is Duval County's principal fresh-water source and is suitable for domestic and most industrial uses (Leve 1966 in JEA/FP&L 1981a). The quality of water from the Floridan Aquifer is variable depending on the sampling location, sampling depth, and date of sampling. Average concentrations are listed in Table 3.3-2.

Contaminants including hydrogen sulfide gas (1-3 mg/l) and chlorides (10-30 mg/l) have been reported from wells in the Floridan Aquifer in Duval County (Leve and Goolsby 1969; Leve 1966 in JEA/FP&L 1981a). Increases in chloride concentrations have been documented in several high yield wells and are attributed to high rates of pumping which cause a distinct cone of depression and lower the potentiometric surface. Chloride concentrations increased during the twenty-two year period from 1940 to 1962 due to heavy pumping (JEA/FP&L 1981a). Wells penetrating permeable zones deeper than the Ocala Group generally have higher chloride concentrations because there is less hydrologic separation from the inferior quality water within the Cedar Keys Limestone and underlying formations (Leve 1966 in JEA/FP&L 1981a). In some areas, however, confining beds may retard movement between the zones of high and low saline water.

Testing of water samples obtained from Floridan Aquifer wells selected in the vicinity of the SJRPP site indicate that the water is of the calcium bicarbonate type. With the exception of high chloride concentrations of 210 mg/l in one well near SJRPP, there is no indication of chloride contamination in the area. Detailed groundwater quality data for the Floridan Aquifer in the area of the SJRPP/NGS sites are contained in Appendix M, Tables 4.3-3 and 4.2-4, and are summarized in Table 3.3-2.

Table 3.3-2. Summary of Floridan Aquifer water quality data in the vicinity of the SJRPP site (JEA/FP&L 1981a).

Parameter	Concentration		
	Minimum	Mean	Maximum
Specific Conductance (umhos/cm)	58	528	1,187
Hardness (as $CaCO_3$)	45	248	435
Calcium (mg/l)	11	60	96
Magnesium (mg/l)	4	26	43
Sodium (mg/l)	13	19	90
Bicarbonate (mg/l)	54	186	309
Sulfate (mg/l)	0	88	130
Chloride (mg/l)	13	28	210

Table 3.3-1. State and Federal groundwater quality criteria[a].

Constituent	State of Florida[b] Class I-B Waters	USEPA Drinking Water Standards[c] Primary	USEPA Drinking Water Standards[c] Secondary
Inorganic:			
Arsenic	0.05	0.05	
Barium	1.0	1.0	
Cadmium	0.01	0.010	
Chloride			250
Chromium	0.05	0.05	
Color			15
Copper			1
Fluoride	1.5[d]	1.4-2.4[e]	
Foaming Agents			0.5
Iron			0.3
Lead	0.05	0.05	
Manganese			0.05
Mercury	0.002	0.002	
Nitrate (as N)	10.0	10.0	
Odor			3
pH			6.5-8.5
Selenium	0.01	0.01	
Silver	0.05	0.05	
Sulfate			250
Total Dissolved Solids			500
Zinc			5
Radioactive Substances:			
Radium (226 + 228)	5	5	
Gross Alpha[f]	15	15	
Organic Chemicals:			
Endrin	0.0002	0.0002	
Lindane	0.004	0.004	
Methoxychlor	0.1	0.1	
Toxaphene	0.005	0.005	
2,3,-D	0.1	0.1	
2,4,5-TP	0.01	0.01	

---

[a] All values in milligrams per liter (mg/l) except color which is in color units, odor which is in odor units, pH which is in Standard Units, and radioactive substances which are in picocuries per liter (pCi/l)

[b] Florida Administrative Code, Chapter 17-3, March 1, 1979

[c] Environmental Protection Agency, National Intermim Primary and Secondary Drinking Water Regulations; 40 CFR Parts 141 and 143, as amended.

[d] 1.5 mg/l or background levels, whichever is greater

[e] Specific limit depends upon average maximum daily temperature

[f] Including radium 226; excluding radon and uranium

Water in the "shallow-rock" aquifer and the intermediate sand zone at SJRPP is also of the calcium bicarbonate type. Some sodium and chloride ions are present as a higher percentage of the total ionic weight in the intermediate sands. Water in the water table aquifer differs from that of other shallow aquifers by having a lower concentration of total dissolved solids. The principal ions in solution are sodium and chloride with some calcium sulfate and magnesium ions also present (JEA/FP&L 1981a).

Water produced from the water table and the shallow rock aquifer is of acceptable quality for domestic supply, heat exchange, and agricultural uses (Fairchild 1971 in JEA/FP&L 1981a). In general the water quality from these aquifers compares favorably with both State criteria for Class 1-B waters and with USEPA Primary and Secondary Drinking Water Standards. Water quality data for shallow aquifers in Duval County and at the SJRPP/NGS sites are summarized in Appendix M, Tables 4.2-4. Data for the North Landfill monitoring wells are presented in Appendix M, Tables 4.2-5, 4.2-6, and 4.2-7.

3.3.3.3 Volusia County and the Sanford Site

Knochenmus and Beard (1971) indicated that the mineral content of water from the Floridan Aquifer in Volusia County ranges from 100 to 400 mg/l except in the highly mineralized areas along the St. Johns River (Sanford Plant site) and the Atlantic Coast. Groundwater quality is highly variable with dissolved solids ranging from less than 100 mg/l to several thousand mg/l (JEA/FP&L 1981a). These values represent water ranging from a calcium bicarbonate type to waters of the sodium chloride type. The distribution of total hardness values is similar to that of dissolved solids, with low values in the interior of the County and high hardness and sodium chloride values in water discharged along the coast and the St. Johns River (Knochenmus and Beard 1971). Chloride in the groundwater is derived from rainfall and from the saline water that is present at depth in the Aquifer. A deep well drilled in 1969 showed that the depth to saline water was 1,450 feet. This zone can shift up and down as a result of changes in hydraulic head in the upper and lower parts of the Aquifer (Knochenmus and Beard 1971). Increased chloride concentrations occur where heavy pumping or leakage along faults lowers the artesian pressure in the freshwater portion of the Aquifer causing upward movement of underlying salt water zones (Wyrick 1960). Water quality data for the City of Deland, a private Deland area well, and for Orange City are presented in Appendix M, Table 4.2-8 (Knochenmus and Beard 1971).

Groundwater in the shallow aquifer system is less mineralized than that in the Floridan Aquifer because of the lower solubility of the sand. The mineral content of water from shallow wells completed in sand ranges from 25 to 50 mg/l, while the mineral content of groundwater in shell beds is higher due to solubility of the shells. The principal dissolved minerals in this groundwater are sodium, chloride, calcium, and bicarbonate (Knochenmus and Beard 1971).

3.4 EARTH RESOURCES

This section includes descriptions of the existing local and regional physiography, topography, soils, and geology of the proposed SJRPP site, the

NGS, and FP&L's Sanford Plant. These three sites lie in the St. Johns River Basin, an elongated area of approximately 11,200 square miles in northeast Florida (Snell and Anderson 1970). The area is underlain by limestone and sands of Pleistocene to Eocene age and the surface is generally comprised of sands and gravels of Pleistocene and Holocene terrace deposits. The terrace deposits parallel the shoreline and form the topography of northeast Florida.

The SJRPP site and the NGS site are adjacent to each other and the geology, soils, and topography for the two sites are essentially identical. The Sanford Plant exists on a site that is similar in these respects to the other two even though the sites are approximately 100 miles apart. The regional geology for both areas is the same.

3.4.1 Physiography and Topography

Florida can be divided into three major transpeninsular physiographic zones: the Northern or Proximal Zone; the Central or Mid-peninsular Zone; and the Southern or Distal Zone (JEA/FP&L 1981a). The SJRPP and NGS sites are in the Northern Zone while the Sanford Plant site lies within the Central Zone (Figure 3.4-1).

3.4.1.1 SJRPP and NGS Sites

The SJRPP and NGS sites lie in the Northern Zone and are characterized by highlands bordered by tidal marshes and estuaries of the St. Johns River. The topography is controlled by Pleistocene marine terraces and beach ridges. Elevations range from 5 to 28 feet above sea level. Most areas on the site with elevations of greater than 10 feet are highlands and lie in the northern portion while most areas of less than 10 foot elevation are wetlands along the southern portion of the site.

3.4.1.2 Sanford Site

The Sanford Plant lies within the Central Zone physiographic region and is situated in the St. Johns River Valley portion of that region. The topography consists of nearly level, poorly drained terraces and sloughs. The Sanford Plant site is nearly level to flat with an elevation of approximately 5 feet above sea level.

3.4.2 Soils and Geotechnical Conditions

3.4.2.1 SJRPP and NGS Sites Surficial Deposits

The soils found on the SJRPP and NGS sites including Blount Island consist of two general soil associations, the Kershaw-Ortega Association and Tisonia Association. These associations are described by the Soil Conservation Service (USDA 1978) as:

- Kershaw-Ortega. Nearly level to sloping, excessively drained to moderately well drained soils that are sands.

- Tisonia. Level and nearly level, very poorly drained, saline, organic soils found in marshes.

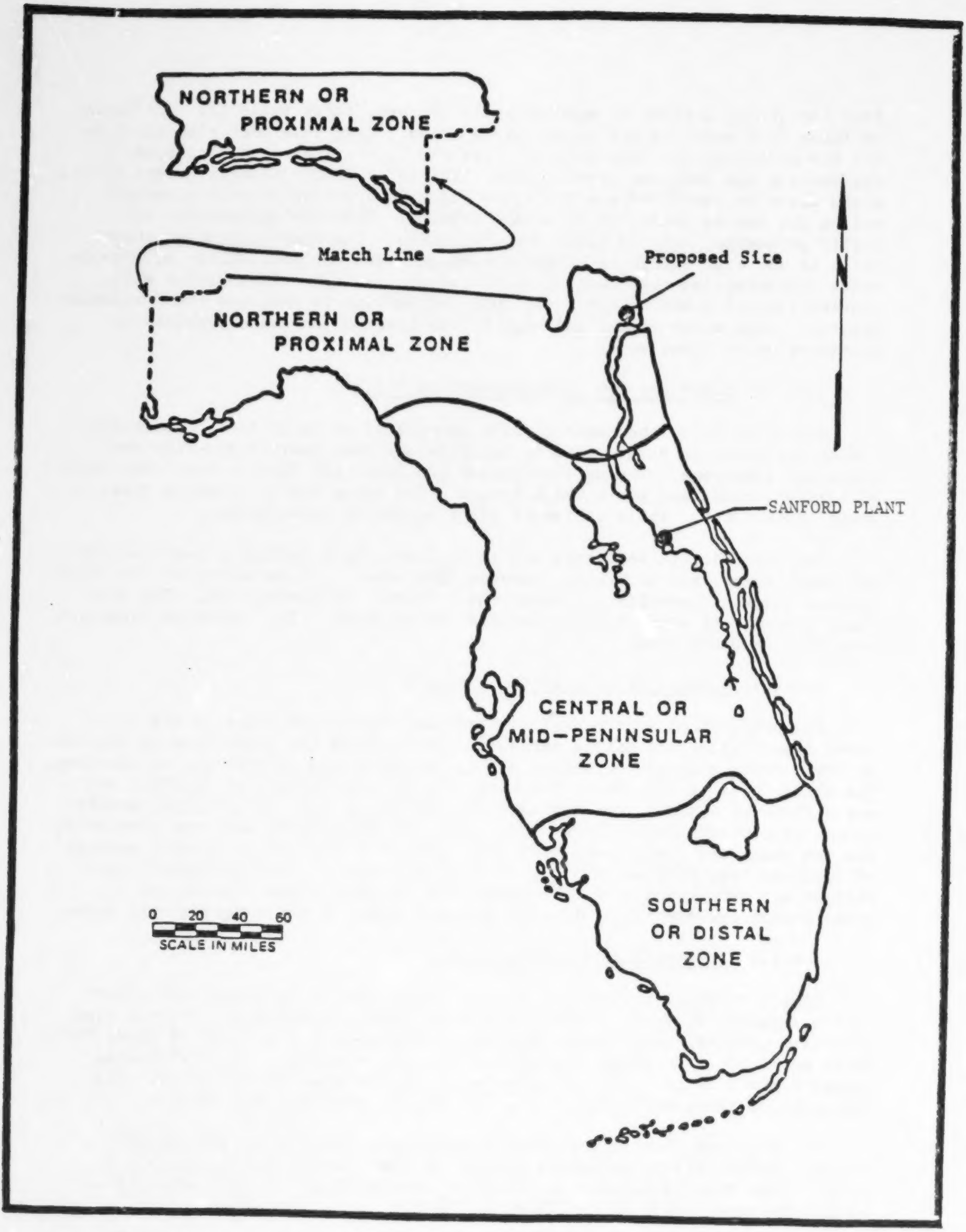

NORTHERN OR
PROXIMAL ZONE
Match Line
Proposed Site
N
NORTHERN OR
PROXIMAL ZONE
SANFORD PLANT
CENTRAL OR
MID-PENINSULAR
ZONE
SOUTHERN
OR DISTAL
ZONE
0 20 40 60
SCALE IN MILES

Figure 3.4-1. Physiographic divisions of Florida (White 1970).

From the ground surface to approximately 15 feet, these soils are very loose to loose fine sands except in the marsh areas. They have been classified by the SCS according to their suitabilities and limitations regarding special engineering and land use capabilities. The soils in the Kershaw-Ortega Association found on the SJRPP and NGS sites all have a severe or poor potential rating for use as landfills or sewage lagoons. They are excessively wet, highly permeable, and too sandy for these uses. The clay content of these soils is not high enough to minimize seepage; thus the possibility of groundwater contamination from landfills and lagoons is high. These soils will require special construction techniques and designs to overcome their undesirability. High water tables and high permeabilities can cause problems in construction on these soils.

3.4.2.2 SJRPP and NGS Sites Subsurface Soils

The soils below the surface soils consist of 40 to 50 feet of unconsolidated sediments of Pleistocene to Holocene age that overlie Mio-Pliocene sands and limestone. The unconsolidated sediments are fine to very fine sands of marine terrace and beach ridge origin. The sands are of a medium dense to dense consistency. These sediments are a source of groundwater.

The Mio-Pliocene sediments are sandy limestones, partially cemented shell and sand layers, and partially cemented fine sands. These sediments are 30 to 45 feet thick and overlie the Hawthorne Formation of Miocene age. The Hawthorn consists of sandy silty clays and clayey sands. The Hawthorne Formation overlies the Ocala Group.

3.4.2.3 Sanford Site Surficial Deposits

The soils found in the Sanford Plant area are sandy soils of the St. Johns River Valley and marine terraces. These sands are classified by the SCS as SP-SC sands that are generally highly permeable and susceptible to flooding. The soils found on the plant area have very poor potential for landfill and waste disposal applications and very poor potential for use in ponds, embankments, or diversion structures. The soils are excessively wet, too permeable, and too sandy for these uses. The clay content is too low to prevent seepage of leachate into shallow aquifers or surface waters. Special construction designs and techniques will be necessary to overcome these limitations in construction and operation of waste disposal areas on the existing soil types.

3.4.2.4 Sanford Site Subsurface Soils

Strata directly beneath the surface soils consist of Recent and Pleistocene deposits of sands, shells, and clay. These deposits are chiefly fine to medium grained quartz sands intermixed with shells. In parts of areas the sands may exhibit a yellow or orange iron oxide staining. The Pleistocene deposits are a major source of groundwater in the area (Wyrick 1960). The thickness of these sediments is from 10 feet to approximately 70 feet.

Mio-Pliocene clastic sediments are directly beneath the Pleistocene strata. These clastic sediments consist of fine sands, shells, and silty clays. They reach a maximum thickness of approximately 75 feet and directly overly the upper units of the Floridan Aquifer.

3.4.2.5 Bedrock - SJRPP, NGS, and Sanford Sites

All sites are underlain by geologic formations that correlate from site to site. That is, the general geology is essentially the same for the NGS, SJRPP, and Sanford sites. The first consolidated strata at both sites is the Ocala Group which consists of the Crystal River Formation, the Williston Formation, and the Inglis Formation. The Ocala Group overlies, in descending order, the Avon Park Limestone, the Lake City Limestone, and the Oldsmar Limestone, all of Eocene age.

3.4.3 Regional Geology

Peninsular Florida is part of the Eastern Gulf Coast Sedimentary Basin with a sedimentary sequence of limestones, dolomites, evaporites, and unconsolidated sands, gravels, and clays that ranges in depth from 8,000 feet in northern Florida to 18,000 feet in southern Florida. These strata are of late Mesozoic to Recent ages. The present land surface is covered with Pliocene and younger unconsolidated sediments resulting from fluctuations in sea level. They are generally marine terrace and beach ridge deposits. Eocene and younger rocks comprise the strata encountered at the surface and are penetrated by most water wells in the area. The principal aquifers used in this area are of Eocene or younger age.

3.4.4 Site Geology (SJRPP, NGS, and Sanford Sites)

Geologically, the SJRPP site and the NGS site are virtually the same. The proximity of the two sites precludes any major differences between them. The Sanford site and the SJRPP and NGS sites are also very similar geologically. The two areas lie in the same geologic region and the rock units are correlative from one area to the other.

Both areas are covered with unconsolidated sediments of Pleistocene to Recent age that are primarily marine terrace and beach ridge deposits. These sands and gravels overlie Mio-Pliocene deposits and the Hawthorn Formation. The Mio-Pliocene strata consist of semi-consolidated sands, gravels, shells, and clay materials. The Hawthorn Formation is the upper confining layer for the Floridan Aquifer in most areas and consists of clays, sands, and some limestone.

Unconformably beneath the Hawthorn Formation lies the Ocala Group. At the SJRPP and NGS sites it is approximately 450 feet deep and at the Sanford Plant approximately 100 feet deep. The Ocala Group overlies, in descending order, the Avon Park Limestone, the Lake City Limestone, and usually the Oldsmar Limestone. These strata are all of Eocene Age and comprise the Floridan Aquifer. They are limestones and dolomites, generally very permeable, and yield high quantities of groundwater. Table 3.4-1 indicates the general stratigraphy of the Eocene and younger rocks found in Florida.

3.4.5 Existing Solid and Hazardous Waste Generation and Disposal

3.4.5.1 SJRPP Site

Presently no solid or hazardous wastes are generated or disposed of on the SJRPP site. Plans for the SJRPP include waste disposal areas of 551 acres

Table 3.4-1. Stratigraphy of the Cenozoic formations of Florida (JEA/FP&L 1981a).

Geologic Age	Stratigraphic Unit	Lithologic Character
Recent and Pleistocene	Recent and Pleistocene deposits	Soil, muck, coarse to fine sand, shell, and some clayey sand
Pliocene?	Pliocene and Upper Miocene deposits	Gray-green calcareous, silty clay and clayey sand; contains shell beds and white soft, friable limestone beds
Miocene	Hawthorn Formation	Gray to blue-green calcareous phosphatic, sandy clays and clayey sands; contains fine to medium phosphatic sand lenses and limestone and dolomite beds, particularly near the base of the formation.
Eocene	Crystal River Formation	White to cream chalk, massive fossiliferous marine limestone
	Williston Formation	Tan to buff granular, marine limestone
	Inglis Formation	Tan to buff granular, calcitic marine limestone; contains thin dolomite lenses and zones of Miliolidate foraminiferal coquina
	Avon Park Limestone	Alternating beds of brown to tan hard, massive dolomite, brown finely crystalline dolomite, and granular calcitic limestone
	Lake City Limestone	White to Brown, purple-tinted lignitic, granular limestone and gray hard, massive dolomite; contains lignite beds and zones of Valvulinidae foraminiferal coquina
	Oldsmar Limestone	Cream to brown massive to chalky granular limestone and tan to brown massive to finely crystalline dolomite

at three locations. Two of the solid waste disposal facilities will be located adjacent to and south of Island Drive. The largest solid waste disposal area will be located adjacent to and north of Island Drive. These areas are presently classified as grassy scrub/pine flatwood, pine flatwood, hardwood hammock, and bottomland hardwood. Fine sandy soils are dominant in these areas. Presently the Jacksonville municipal landfill is operating adjacent to and north of the SJRPP boundary. This landfill has 17 years of capacity at 550 tons per day.

3.4.5.2 NGS Site

Contacts with the City of Jacksonville Bioenvironmental Services Group (Bailey 1981) indicated that very little solid waste is generated by the NGS Units 1, 2, and 3. No inventory is presently kept by the Bioenvironmental Services Group. Based on maximum continuous ratings for these units, it is estimated that 392.2 tons of bottom ash were generated in 1980. Solid waste generated at the existing NGS is disposed of on-site.

3.4.5.3 Sanford Plant

In 1980 the Sanford Plant produced 586 tons per year of bottom ash and 1,969 tons per year of fly ash from Units 1, 2, and 3. Ash disposal is to landfills and/or sluiced to lined sediment ponds.

3.5 AQUATIC AND TERRESTRIAL ECOLOGY

This section provides a summary of the existing biological resources in the vicinity of the St. Johns River Power Park (SJRPP), Northside Generating Station (NGS), and Sanford sites. A detailed discussion of the existing biological environment is provided in Appendix O.

3.5.1 SJRPP/NGS

3.5.1.1 Aquatic Ecology

The proposed SJRPP site and NGS site are adjacent to the extreme northern portion of the St. Johns River. Aquatic communities are typical of southeastern estuaries, but are currently stressed by poor water quality caused by elevated nutrient and pollutant loadings. Aquatic plants important to the ecology of the estuary include phytoplankton, periphyton, and emergent marsh vegetation. These primary producers support animal life within the estuary either directly or via production of detritus (dead plant material). Aquatic animal life in the area includes zooplankton, benthic invertebrates, fish, and marine mammals. Although stressed by poor water quality, the St. Johns River in the vicinity of the SJRPP and NGS is nevertheless a highly productive estuarine area.

Since the SJRPP will utilize the NGS discharges as a source of cooling makeup water, the NGS discharge must be considered as part of the existing environment. A summary of the results of the NGS 316 demonstration is provided in Section 1.1.1.3 of Appendix O. The 316 demonstration considered effects of thermal discharge, impingement of organisms on intake screens, and entrainment of plankton. This study showed that the NGS had no significant effect on the indigenous populations of shellfish, fish, and wildlife in the

St. Johns River in the vicinity of the plant. However, several fishkills in the vicinity of NGS have been attributed by FDER to the NGS discharge (Ryan 1981).

Flora

Phytoplankton are the most important primary producers in the open waters of the St. Johns River estuary. Densities, rates of production, and species composition of phytoplankton populations all indicate that the River is subject to excessive nutrient and pollutant loadings. The USCOE (1976) reported that diatoms were the most abundant phytoplankton in waters of Duval County. Studies at the NGS showed that phytoplankton communities were dominated by pennate and centric diatoms, dinoflagellates, and cryptomonads with occasional reports of green and bluegreen algae blooms (JEA 1976). JEA (1976) indicated that total densities of algae ranged from 200 to 6,750 organisms/ml during a one-year study period. Periphyton populations in the upper St. Johns River are composed primarily of diatoms (Weston, Inc. 1978). Periphyton are important primary producers in area salt marshes (JEA/FP&L 1981a).

Extensive tidal salt marshes border the SJRPP site on both the south and east sides. The dominant emergent plants in these areas are black needlerush (*Juncus roemerianus*) and salt marsh cordgrass (*Spartina alterniflora*; *S. patens*). Areas of Blount Island Channel in the vicinity of the SJRPP site are bordered by narrow marshy areas with growths of black needlerush and cordgrass. Extensive undisturbed tidal salt marshes also border San Carlos Creek in the vicinity of the NGS. Submerged aquatic vascular plants occur in seasonally flooded wetlands on the SJRPP site, but do not occur in the Channel. Tidal salt marsh communities provide nursing, spawning, and/or feeding habitats for many species of commercially important fish and shellfish. Salt marshes also produce large amounts of dead plant material (detritus) which supports the estuarine food web. These communities also maintain the ecological balance of the estuary by helping to filter pollutants, nutrients, and sediments which otherwise might flow directly into sensitive nursery and spawning grounds. Wetlands also act as aquifer recharge zones and help to maintain salinity patterns.

Fauna

Zooplankton. The principal zooplankton in the St. Johns River estuary are copepods of the genus *Acartia*, cladocerans, larval forms of benthic animals (primarily barnicle nauplii and cypris larvae), arrow worms (*Sagitta* sp., and mysid shrimp (JEA/FP&L 1981a). Zooplankton are an important intermediate component of estuarine food webs. They are preyed upon intensively by many commercially important species (e.g., menhaden) as well as by non-commercial but ecologically important fishes (e.g., anchovies, silversides). Section 1.1.1.2 of Appendix O summarizes information on seasonal abundance, species composition, and other aspects of the ecology of zooplankton in the study area.

Macroinvertebrates. Benthic macroinvertebrate populations in the study area are dominated by polychaetes, oligochaetes, and small crustaceans (JEA/FP&L 1981a). Benthic population densities in the vicinity of the NGS and SJRPP are generally low with scattered, high density patches of several opportunistic species. Benthic invertebrates are consumed by redfish, sea trout, croakers, and many other predators. A more detailed description of the ecology of this group of organisms is provided in Section 1.1.1.2 of Appendix O.

Oysters, shrimp, and crabs are abundant in the St. Johns River estuary. Commercial shrimp and blue crab spawn offshore and move into tidal creeks and salt marsh areas of the St. Johns River near the NGS where they grow and mature. Commercially important species include white shrimp (*Penaeus setiferus*), brown shrimp (*P. aztecus*), pink shrimp (*P. duorarum*), and blue crab (*Callinectes sapidus*). A limited amount of oysters are commercially harvested from a small area in northeast Duval County (USCOE 1980). The FDER has not approved the St. Johns River in Duval County for shellfish harvesting, however (JEA/FP&L 1981a).

Fish and Ichthyoplankton. The St. Johns River estuary supports an abundant and varied fish community including both seasonal and permanent residents of the estuary (mummichog, menhaden, weakfish, perch, spot, spotted seatrout), anadromous species (shad, striped bass), occassional oceanic species (bluefish, tarpon, jacks) and strays from freshwater areas (gars, catfish). Freshwater creeks, tidal creeks, and the St. Johns River have been previously surveyed in the vicinity of the NGS (JEA/FP&L 1981a). This study lists 113 fish species of fish from the estuarine portion of the St. Johns River. Many of these species are commercially important and use the area near the NGS as spawning and nursery grounds during different seasons of the year. The availability of these areas is essential to the maintenance of a viable commercial fisheries industry.

3.5.1.2 Terrestrial Ecology

Northeastern Florida falls within the southern mixed forest category as defined by Kuchler (1964). The region is characterized as a tall forest with broadleaf deciduous and evergreen species. Dominant trees are sweetgum, southern magnolia, slash pine, loblolly pine, and oaks. The following discussion deals primarily with ecology of the SJRPP site. Communities on the NGS site were assumed to be either highly disturbed or previously eliminated.

Main Site Area Vegetation

Nine major vegetation communities were identified within the boundaries of the SJRPP, including pine flatwoods (504 acres), grassy scrub (25 acres), grassy scrub pine flatwoods (363 acres), hardwood swamp (100 acres), hardwood hammock (415 acres), bottomland hardwood (80 acres), bayhead (23 acres), cypress swamp (40 acres), and salt marsh (41 acres) (JEA/FP&L 1981a). The distribution of the nine communities is illustrated in Figure 3.5-1 and their major characteristics are summarized on Table 3.5-1. Detailed descriptions of each of the types of plant communities are provided in Appendix O.

Blount Island Vegetation

Much of the vegetation on Blount Island has been disturbed. Six major vegetation types have been identified on the Island (Figure 3.5-2). These communities are restricted to the periphery of the Island, primarily along the old river channel and along the remnants of Alligator Creek. They include

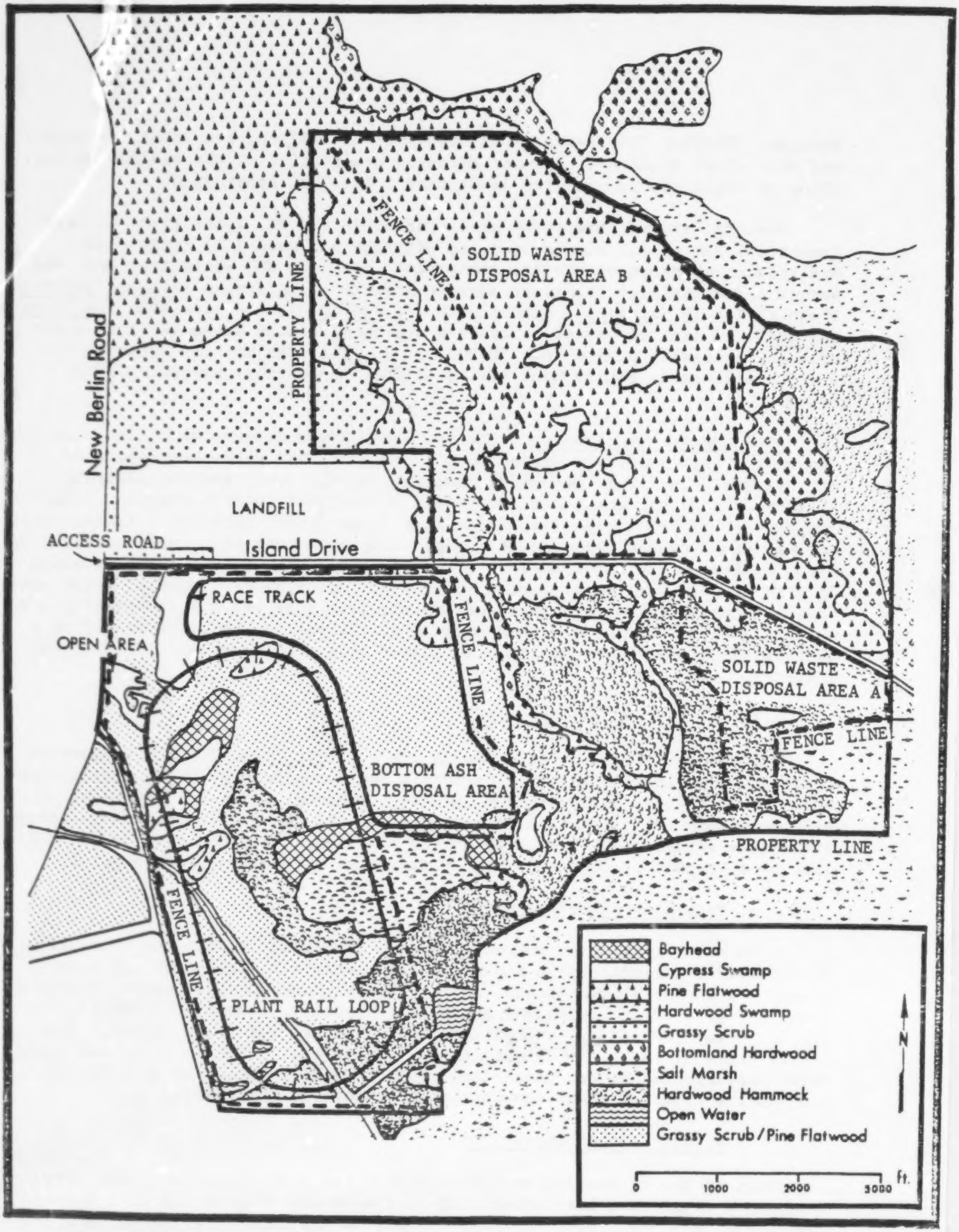

New Berlin Road
PROPERTY LINE
FENCE LINE
SOLID WASTE DISPOSAL AREA B
LANDFILL
ACCESS ROAD
Island Drive
RACE TRACK
OPEN AREA
FENCE LINE
SOLID WASTE DISPOSAL AREA A
FENCE LINE
BOTTOM ASH DISPOSAL AREA
PROPERTY LINE
FENCE LINE
PLANT RAIL LOOP
Bayhead
Cypress Swamp
Pine Flatwood
Hardwood Swamp
Grassy Scrub
Bottomland Hardwood
Salt Marsh
Hardwood Hammock
Open Water
Grassy Scrub/Pine Flatwood
N
0
1000
2000
3000
Ft.

Figure 3.5-1. Vegetation community types on the SJRPP site (JEA/FP&L 1981a).

Table 3.5-1. Summary of major characteristics of each of the nine plant communities on the SJRPP site (JEA/FP&L 1981a).

Community Type	Percent of Site Covered*	Approximate Degree of Disturbance	Common Dominant Canopy Plants	General Characteristics
Pine Flatwoods	30	75% timbered north of Island Drive	Slash pine; long leaf pine	Common upland community throughout area.
Grassy Scrub/Pine Flatwoods	22	Disturbed by fire in past	Turkey oak or slash pine (where canopy present)	Poorly developed canopy; common community in area.
Grassy Scrub	1.5	Unknown	No canopy present; dominant are saw palmetto, ink berry, southern bayberry	Common in area.
Hardwood Swamp	6	Undisturbed	Red maple, buttonbush, black gum, bayberry	Seasonally flooded forested wetland; complex canopy structure; located next to salt marsh and connected via channels.
Hardwood Hammock	25	Undisturbed	Live oak, water oak, scrub-hickory	Located next to salt marshes; complex canopy structure.
Bottomland Hardwood	4.8	Undisturbed	Red maple, American elm, water oak, black gum	Seasonally flooded forested wetland located in lower areas.
Bayhead	1.7	Undisturbed	Loblolly bay, red bay, sweet gum, southern bayberry	Seasonally flooded forested wetland located adjacent to hardwood and cypress swamps.
Cypress Swamp	2.4	Undisturbed	Cypress or cypress/blackgum	Seasonally flooded forested wetland; tidally flooded.
Salt Marsh	2.5	Undisturbed	*Juncus* or *Spartina*	Highly valuable emergent wetland.

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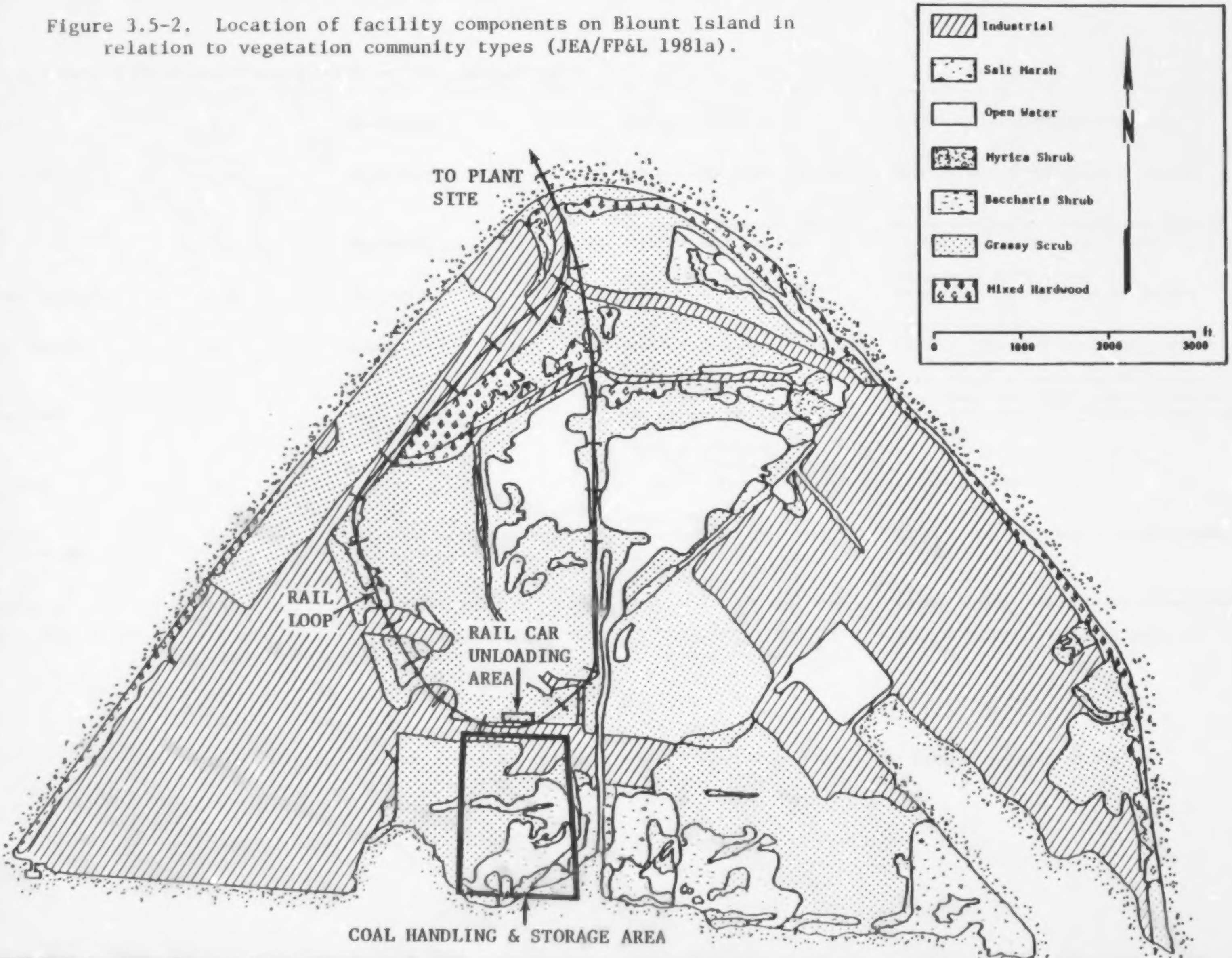
* Based on a total of approximately 1656 acres on the site (JEA/FP&L 1981a).

Figure 3.5-2. Location of facility components on Blount Island in relation to vegetation community types (JEA/FP&L 1981a).



▨ Industrial
Salt Marsh
Open Water
Myrica Shrub
Baccharis Shrub
Grassy Scrub
Mixed Hardwood
N
0
1000
2000
3000
ft
TO PLANT SITE
RAIL LOOP
RAIL CAR UNLOADING AREA
COAL HANDLING & STORAGE AREA

Baccharis shrub, grassy scrub, Myrica shrub, water/beach, and salt marsh. Mixed hardwoods also exist on the Island, but are not within the proposed facility boundaries (JEA/FP&L 1981a). Descriptions of these communities are found in Section 1.1.2 of Appendix O.

Transmission Corridor Vegetation

The region through which the preferred corridor passes is characterized by abundant and diverse wetland types, large farm and agricultural acreage, and extensive natural plant communities (JEA/FP&L 1981a). The first segment of the corridor from the proposed plant to the Robinwood Substation is predominantly wetland and open water (Figure 3.5-3). The upland area is primarily on Blount Island. The remainder of the corridor to the Robinwood Substation contains a large amount of wetlands (Jacksonville Area Planning Board 1975). The corridor from the SJRPP to the Normandy Substation initially passes primarily through upland areas. The next segment is primarily upland and agricultural. More wetlands occur in the northern half of this mile-wide corridor than in its southern half. The final segments are largely upland and agricultural lands. Approximately 20% of these corridor segments are made up of several wetland types (JEA/FP&L 1981a). However, most of the wooded wetlands in the entire corridor have been drained.

Wildlife of Main Site and Blount Island

Mammals, birds, reptiles, and amphibians are important ecological components of the modified and natural communities of the SJRPP site and vicinity. Table 3.5-2 identifies the relative abundance and diversity of wildlife observed on the site. Species having a commercial or recreational value are described in Table 3.5-3. The SJRPP site supports a wide variety of wildlife. Seasonally flooded and tidally flooded wetlands on the site are the most important wildlife areas since they provide the most plentiful food and shelter. Appendix O provides a detailed description of wildlife characteristics of each habitat on the SJRPP site.

Biologically Sensitive Areas and Resources

Biologically sensitive areas on the SJRPP site and coal unloading facility area include wetlands and habitats for rare, threatened, or endangered species. A full description of both types of sensitive areas is provided in Appendix O.

The wetlands on the site including bottomland hardwood, cypress swamp, bayhead, hardwood swamp, and salt marsh are highly valuable ecosystems. These communities encompass approximately 290 acres of the proposed site. They provide food and shelter for a wide variety of animal life and are also an important link between upland and estuarine environments.

Table 3.5-4 summarizes the information concerning rare, threatened or endangered species which occur or could potentially occur in the vicinity of the NGS or SJRPP sites. Included in the table is a description of the habitat or area in which each could occur. It is significant that several of these species either occur on the SJRPP site itself or occur in the wetland areas immediately to the south or east of the site. The gopher tortoise (listed as threatened by the State) occurs on the SJRPP site. The gopher tortoise harbors

Figure 3.5-3. Wetlands and other sensitive areas along the proposed transmission line ROW (JEA/FP&L 1981a).

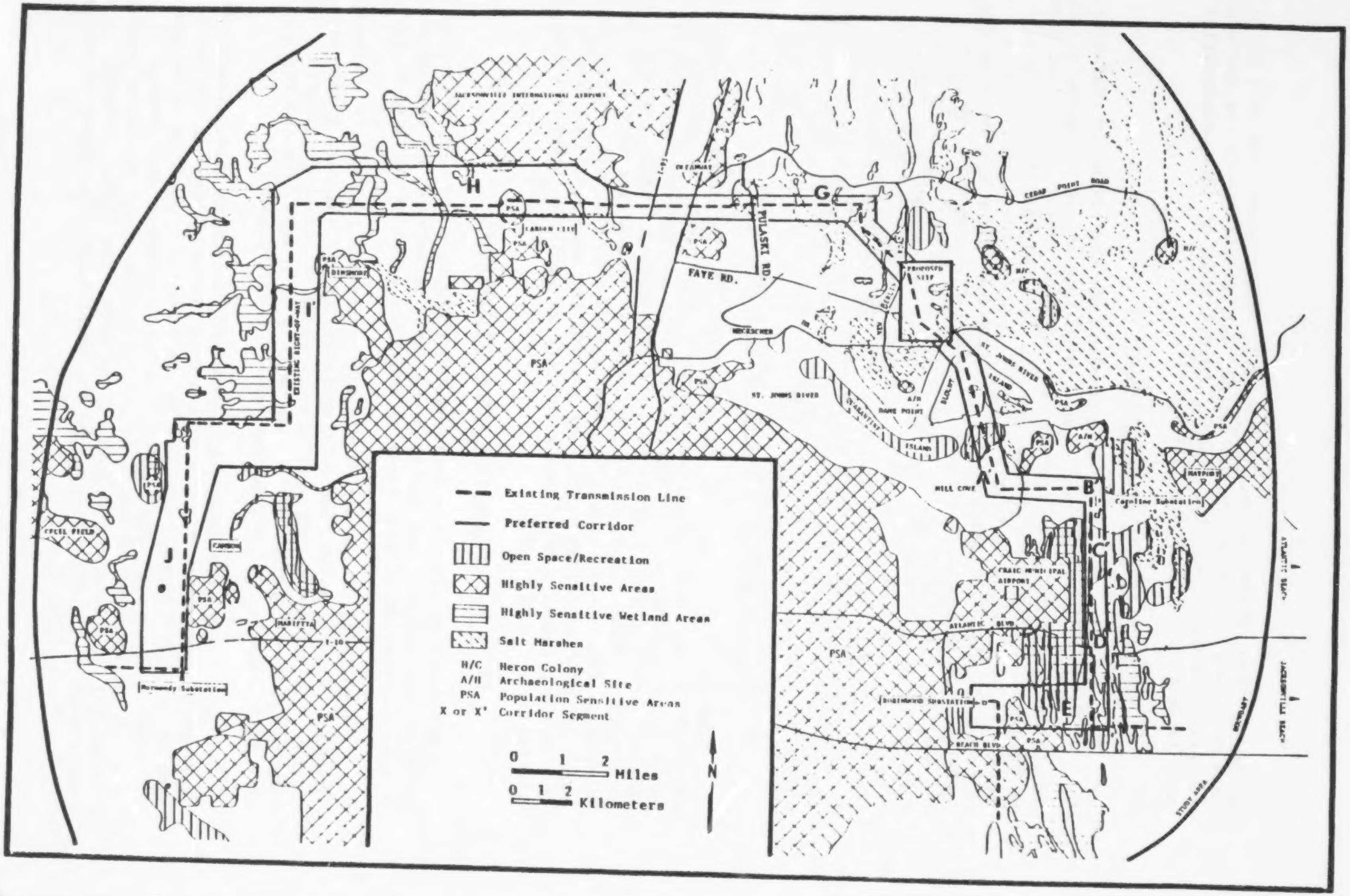

Existing Transmission Line
Preferred Corridor
Open Space/Recreation
Highly Sensitive Areas
Highly Sensitive Wetland Areas
Salt Marshes
H/C Heron Colony
A/H Archaeological Site
PSA Population Sensitive Areas
X or X' Corridor Segment
0 1 2 Miles
0 1 2 Kilometers
N
JACKSONVILLE INTERNATIONAL AIRPORT
CEDAR POINT ROAD
PULASKI RD.
FAYE RD.
PROPOSED SITE
ST. JOHNS RIVER
DAME POINT
BLOUNT ISLAND
QUARANTINE ISLAND
MILL COVE
CRAIG MUNICIPAL AIRPORT
ATLANTIC BLVD
BEACH BLVD
Caroline Substation
MAYPORT
ATLANTIC BEACH
JACKSONVILLE BEACH
STUDY AREA BOUNDARY
EXISTING RIGHT-OF-WAY
Normandy Substation
CECIL FIELD
MARIETTA
PSA
A
B
C'
D
E
G
H
I'
J

Table 3.5.-2. Characteristics of wildlife and wildlife habitats observed on the proposed SJRPP site (JEA/FP&L 1981a).

Habitat Type	Total Number of Acres On-site	% of Total Acres[a]	Relative Plant Diversity[b]	Number of Common Mammalian Species Observed	Number of Bird Species Observed	Number of Different Species Observed: Common Reptiles	Number of Different Species Observed: Common Amphibians
Pine Flatwoods	504	30	66	4[c]		7[c]	3[c]
Grassy Scrub/ Pine Flatwoods	363	22	129		30[c]		
Grassy Scrub	24.5	1.5	99				
Hardwood Swamp	100	6	56	5[d]	12[d]	3[d]	9[d]
Hardwood Hammock	415	25	57	4	31	4	2
Bottomland Hardwood	79.9	4.8	32				
Bayhead	28.3	1.7	33				
Cypress Swamp	40.1	2.4	45				
Salt Marsh	41	2.5	13	2	30		
Open	58.7	3.5					
Riparian (Blount Island)	84		58		61		
Borrow Pit					11		
Rookery					31[e]		

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[a] Out of a total of 1,655.9 acres on site.

[b] Based on woody and herbaceous species observed.

[c] Includes grassy scrub, scrub flatwood, and pine flatwoods.

[d] Includes hardwood swamp, cypress swamp, and bottomland hardwood including creeks and bayhead.

[e] Observations made during spring and summer only.

Table 3.5-3. Commercially or recreationally valuable species observed on the SJRPP site (JEA/FP&L 1981a).

Common Name	Scientific Name	Value/Habitat
Whitetail Deer	*Odocoileus virginianus*	Big game animal not observed on site
Eastern gray squirrel	*Sciurus carolinensis*	Small game animal absent from hardwood hammock habitat
Marsh rabbit	*Sylvilagus palustris*	Small game animal evident in the less mature of the two bayhead areas and on Blount Island
Raccoon	*Procyon lotor*	Furbearer which occurs in the salt marsh and bayhead habitats
Opossums	*Didelphis marsupialis*	Furbearer commonly found in pine flatwoods
River Otter	*Lutra canadensis*	Furbearer observed on site, common in hardwood swamp areas
Bobwhite Quail	*Colinus virginianus*	Game animal which thrives in open fields and pine flatwoods

Table 3.5-4. Rare, threatened, and endangered species which occur or could potentially occur in the vicinity of the NGS and SJRPP sites (Hendry et al. 1981, Shapiro 1981, and Duval Audubon Society, Inc. 1981).

Common Name	Scientific Name	Status		Potential or Actual Occurrence in Study Area (Appendix O)
		State	Federal	
American alligator	*Alligator mississippiensis*	Species of Special Concern	Threatened	One observed near coal unloading facility; commonly occurs in wetland areas.
Gopher tortoise	*Gopherus polyphemus*	Threatened	-	Burrows observed in pine flatwoods on SJRPP site.
Florida gopher frog	*Rana aerolata*	Threatened	-	Could occur in gopher tortoise burrows.
Eastern indigo snake	*Drymarchon coraius couperi*	Species of Special Concern	Threatened	Could occur in gopher tortoise burrows.
West Indian manatee	*Trichechus manatus latirostris*	Threatened	Endangered	St. Johns River in vicinity of site is within critical habitat.
Shortnose sturgeon	*Acipenser brevirostrum*	Endangered	Endangered	Found in Doctors Lake, South of SJRPP.
Eastern brown pelican	*Pelecanus occidentalis carolinensis*	Threatened	Endangered	Several thousand observed at Little Marsh Island in last 28 years by Duval Audubon Society; occurs in marshes next to SJRPP site.
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Endangered	Could nest in slash pines on east side of SJRPP; nests located in Duval, Clay, and St. Johns Counties.
Wood stork	*Mycteria americana*	Endangered	-	Feed in marshes next to SJRPP; rookery located 20 km southeast of plant on St. Johns River.
Southeastern kestrel	*Falco sparverius paulus*	Threatened	-	Prefers open pine forest; 1,660 sightings at Little Marsh Island since 1948.
Arctic peregrine falcon	*Falco peregrinus tundrius*	Endangered	Endangered	Migrates through area; may over winter; would occur in marshes next to SJRPP and NGS.
Burrowing owl	*Athene cunicularia*	Species of Special Concern	-	This diurnal owl burrows into the ground, inhabiting pocket gopher burrows, or dig their own.

Table 3.5-4. Rare, threatened, and endangered species which occur or could potentially occur in the vicinity of the NGS and SJRPP sites (Hendry et al. 1981, Shapiro 1981, and Duval Audubon Society, Inc. 1981) (concluded).

Common Name	Scientific Name	Status State	Federal	Potential or Actual Occurrence in Study Area (Appendix O)
American oystercatcher	*Haematopus palliatus*	Species of Special Concern	-	Shore bird, would occur in all salt marsh wetland areas adjacent to SJRPP.
Little blue heron	*Florida caerulea*	Species of Special Concern	-	Rookery next to SJRPP; wetland areas.
Snowy egret	*Egretta thula*	Species of Special Concern	-	Rookery next to SJRPP; wetland areas.
Reddish egret	*Dichromanassa rufescens*	Species of Special Concern	-	Rookery next to SJRPP; wetland areas.
Louisiana heron	*Hydranassa tricolor*	Species of Special Concern	-	Rookery next to SJRPP; wetland areas.
Least tern	*Sterna albifrons*	Threatened	-	Nests in three areas on Blount Island.
Red-cockaded woodpecker	*Picoides borealis*	Endangered	Endangered	13 different sightings in Little Marsh Island area in last 28 years; could forage on site at SJRPP.
Florida scrub jay	*Aphelocoma coerulescens coerulescens*	Threatened	-	2 isolated sightings in last 28 years near Little Marsh Island by Duval Audubon Society presence on site at SJRPP unlikely.
Osprey	*Pandion haliaetus*	Threatened	-	Feeds in open water areas near site; nests exist on Blount Island transmission towers.
Southern lip fern	*Cheilanthes microphylla*	Rare	-	Potential to occur in area.
Spoon flower	*Peltandra sagitifolia*	Rare	-	One found in bayhead community on SJRPP site.
Jackson-vine	*Smilax smallii*	Threatened	-	Potential to occur in area.
Bartram's ixia	*Sphenostigma coelestinum*	Threatened	Further Research Required	Potential to occur in area.

at least 30 types of commensal animals, including the indigo snake and gopher frog. The southern bald eagle could nest in the slash pines on the edge of the site. The wood stork (listed as threatened by the State) feeds in the salt marshes next to and on the site and several birds classified as species of special concern by the State occur in the rookery immediately to the east of the site. The red-cockaded woodpecker (listed as endangered by State and Federal governments) could forage on the SJRPP site but would not be expected to nest there. The least tern and osprey both nest on Blount Island and feed in adjacent waters. Many other protected animal species either occur in the area, migrate through it, or overwinter near the site. One specimen of the spoon flower (listed as rare by the State) was found in the bayhead wetland on the site, and three other protected plants could occur there.

3.5.2 Sanford Plant and Vicinity

3.5.2.1 Aquatic Communities

The aquatic ecology of the Sanford Plant area was surveyed by FP&L during 1974 and 1975 (FP&L 1976). The aquatic life forms studied include phytoplankton, periphyton, zooplankton, macroinvertebrates, fish, and shellfish. The study concluded that the operation of the Sanford Plant did not adversely affect the aquatic life in its vicinity.

Green and bluegreen algae were the most abundant phytoplankton. Periphyton were dominated by chrysophyta (diatoms) in March and September 1975, with a seasonal shift to cyanophyta (bluegreen algae) in July. The dominant and co-dominant zooplankters were identified as crustacean nauplii, copepods and rotifers. The area is characterized by sluggish water movements, relatively low water quality, and plankton typically found in eutrophic areas.

The density and diversity of benthic macroinvertebrates were reduced in the immediate area of the discharge plume (FP&L 1976). Benthic populations in the River were typical of areas subject to high organic loading, low oxygen levels, and eutrophic conditions. Population densities were typically low in comparison with less eutrophic areas of Florida.

Statistical analyses of the 1975 sampling data revealed that density, biomass, equitability, conductivity, and dissolved oxygen concentration of the discharge area were not significantly different from that of the intake and River areas. Significant correlations of decreased benthic invertebrate density and decreased diversity and equitability existed with increased temperature in the discharge canal.

The FP&L (1976) report demonstrated that the effects of entrainment and thermal discharges on the local fish and shellfish populations were minimal. Fish populations in the vicinity of the Plant were characterized by a large number of marine and freshwater species representing all trophic levels.

3.5.2.2 Terrestrial Communities

The most common plant communities that could potentially occur in the Sanford vicinity include an open forest of longleaf or slash pine, an understory of fetterbush, saw palmetto, runner oak, gallberry, and wax myrtle, and native grasses such as pineland three awn, different varieties of bluestem, mainden cane, St. John's wort and lopsided indiangrass (USDA 1980).

Based on observations of aerial photographs (USDA 1980), most of the area between the cooling pond and main plant site is open pasture or farmland interspersed with pine flatwoods. Nine small wetlands of unknown type also occur in the area. A relatively continuous area of pine flatwoods also occurs on the east side of this same area (USDA 1980). This area would have the greatest potential to support populations of the gopher tortoise, indigo snake, gopher frog, and associated protected species. Several other protected species could occur in the vicinity of the site (Table 3.5-5).

3.6 CULTURAL RESOURCES

A summary of the available cultural resources in the vicinity of the SJRPP, NGS, and Sanford sites is presented in this section and in Appendix P. Cultural resource data including comments from the State Historic Preservation Officer (SHPO) are available to describe the existing environment at the proposed SJRPP site. Only limited data are available for the NGS and Sanford Plant locations.

3.6.1 SJRPP

The SJRPP project area is located within the Northern St. Johns Archaeological Area. This region between the mouths of the St. Johns and St. Marys Rivers is referred to as a transition zone between the Georgia Coastal tradition and the St. Johns tradition of East Florida (Wood and Rudolph 1980b). Many of the recorded prehistoric shell middens and mounds along the St. Johns River have been destroyed by residential and industrial development (FDAHR 1980). Sources of information on the project area include the 1976 cultural resource survey of Duval County (FDAHR 1980), a cultural reconnaissance report (Wood and Rudolph 1980a), a report of the testing of eleven archaeological sites (Wood and Rudolph 1980b), and the applicants' EID (JEA/FP&L 1981a). These sources indicate the presence of an archaeological district within the project area which has been determined to be eligible for nomination to the National Register of Historic Places (Schull 1981).

A two-phase cultural resource identification program was performed by Southeastern Wildlife Services, Inc. within the proposed SJRPP site boundaries. During Phase 1, a cultural resource reconnaissance survey was conducted to locate and identify potential National Register properties. Ten new archaeological sites and one previously recorded site (8Du634) were located. In consultation with the Florida SHPO, the investigating archaeologists then implemented Phase 2 of the study, the testing of these eleven archaeological sites.

The sites were investigated to gather information necessary to support a request for a determination of eligibility to the National Register. A summary of the results indicates that the sites consist of Orange Period (2000-1000 B.C.) and Savannah Period (700-1500 A.D.) shell and non-shell middens with a mid- to late nineteenth century component. The prehistoric aboriginal occupation sites appear to be specialized shell-fish gathering camps of limited duration. The historic component consists of two domestic structures.

Table 3.5-5. Rare, threatened, and endangered species which could potentially occur in the vicinity of the Sanford site (Shapiro 1981).

Species		Status		
Common Name	Scientific Name	State	Federal	Habitat
American alligator	Alligator mississippiensis	Species of Special Concern	Threatened	Distributed in various wetland types throughout Florida.
Gopher tortoise	Gopherus polyphemus	Threatened	-	Dry, well-drained soils (in pine flatwoods especially) seem to be a prime requisite.
Florida gopher frog	Rana areolata	Threatened	-	In sandhill communities on Bluejack, Turkey Oak ridges and in sand pine scrub.
Eastern indigo snake	Drymarchon corais couperi	Species of Special Concern	Threatened	Pine flatwoods, moist tropical hammocks (S. Fla.), gopher tortois burrows.
West Indian manatee	Trichechus manatus	Threatened	Endangered	Sluggish rivers, shallow estuaries, salt-water bays. St. Johns River.
Sherman's fox squirrel	Sciurus niger shermani	Threatened	-	Longleaf pine-turkey oak association of the sand hills of Florida.
Florida mouse	Peromyscus floridanus	Threatened	-	Sand pine scrub in its early successional stage, also longleaf pine - turkey oak. South Florida slash pine - turkey oak and scrubby flatwoods associations.
Florida black bear	Ursus americanus floridanus	Threatened	-	Florida swamps and bay-galls, thick vegetation.
Bald eagle	Haliaeetus l. leucocephalus	Threatened	Endangered	Riparian, nests near water bodies. Nearest nest is in Section 8, T19S, R30E.
Wood stork	Mycteria americana	Endangered	-	Nests in cypress or mangrove swamps, feeds in freshwater marshes, flooded pastures and flooded ditches.

Table 3.5-5. Rare, threatened, and endangered species which could potentially occur in the vicinity of the Sanford site (Sharpiro 1981) (concluded).

Species		Status		
Common Name	Scientific Name	State	Federal	Habitat
Southeastern kestrel	Falco sparverious paulus	Threatened	-	Open pine forests and clearings, open-edges of river bottoms, coastal regions, suburban areas.
Florida sandhill crane	Gyrus canadensis pratensis	Threatened	-	Prefers wet prairies, marshy lake margins, sparsely vegetated marshes, shallow footed open areas. Nests in shallow water that contains pickerelweed, maidencane, and sagittaria.
Limpkin	Aramus guarauna	Species of Special Concern	-	Associated with slow-moving freshwater rivers and streams, marshes and lake shores.
Little blue heron	Florida caerulea	Species of Special Concern	-	Shallow freshwater, brackish, and saltwater habitats.
Snowy egret	Egretta thula	Species of Special Concern	-	Coastal estuarine, nests in mangroves, willow, buttonbush, wax myrtle, etc.
Louisiana heron	Hydranassa tricolor	Species of Special Concern	-	Estuarine, nests on islands in mangroves, willow, buttonbush, wax myrtle, and pond apple.
Least tern	Sterna albifrons	Threatened	-	Open, flat beach with coarse sand or shell.
Red-cockaded woodpecker	Picoides borealis	Endangered	Endangered	Associated with stands of mature to overmature southern pines.
Florida scrub jay	Aphelocoma coerulescens coerulescens	Threatened	-	Oak scrub consisting of shrubs of live oak, myrtle oak, and chapman oak along with saw palmetto, sand palmetto, and scattered sand pine and rosemary.

The sandy ridges adjacent to the marsh contain Orange and Savannah Period occupations (Figure 3.6-1). Savannah Period occupations also were found on level ridges by a tidal creek, 400 meters from the marsh. The historic occupation centers on two small ridges overlooking the marsh. Site 8Du634 has been severely disturbed. Sites 8Du669, 8Du670, 8Du673, and 8Du674 contain intact cultural levels and/or features. Sites 8Du671, 8Du672, 8Du675, 8Du676, 8Du677, and 8Du678 are small single-component sites of limited horizon and vertical extent (Wood and Rudolph 1980b). In the opinion of the Florida SHPO, eight of the eleven archaeological sites are deemed eligible for the National Register because they contain information important to the knowledge of the prehistoric human occupation and cultural evolution of the region. On 30 September 1981 the Secretary of the Interior concurred that the St. Johns River Power Park Archaeological District is eligible for listing on the National Register of Historic Places (Schull 1981).

The sizes of the sites range from 0.01 to 12.5 ha. (Table 3.6-1) and are located on sandy ridges along the marsh edge. A tidal creek which flows into Browns Creek borders the southeastern edge of the archaeological district. The JEA borrow pit site, 8Du634, is the largest site, but has been subjected to severe disturbances. Site 8Du669 is the second largest site consisting of three identified components: Savannah Period, Deptford Period, and Orange Period. The intact cultural remains and shell middens are indicative of sedentary settlement patterns and exploitation of the coastal lagoons along the St. Johns River. Archaeologically sensitive areas also have been identified in the proposed transmission line corridor (JEA/FP&L 1981a).

3.6.2 NGS

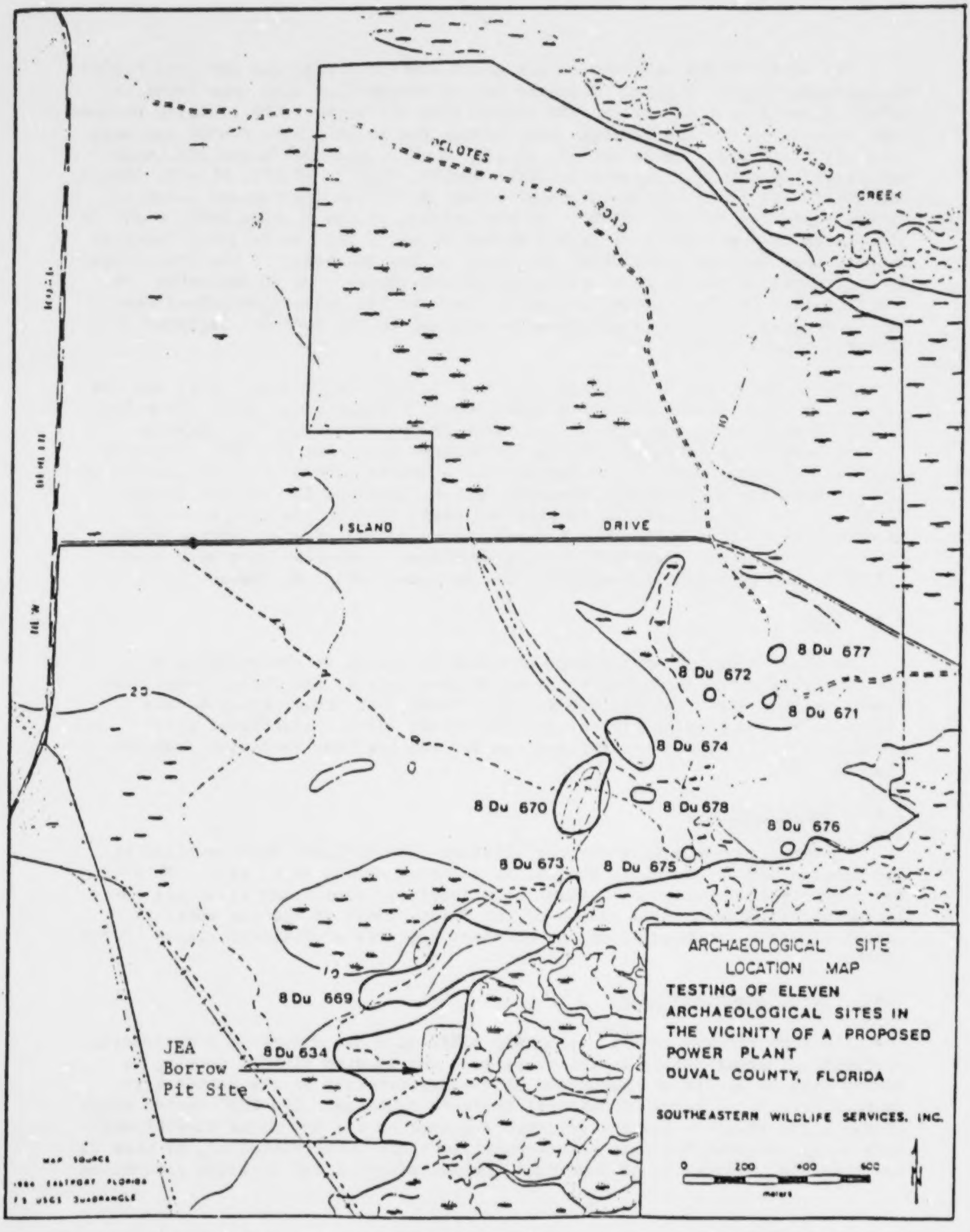
Several important archaeological sites are known in the vicinity of the NGS/SJRPP sites including sites on Pelotes Island, San Carlos Creek West, Browns Island, and Clapboard Creek. Site 8Du91, San Carlos Creek A, was destroyed by the construction of the NGS (FDAHR 1980). Additional site-specific cultural resources information for NGS has been requested from the Florida SHPO.

3.6.3 Sanford Site

Cultural resource data for the existing Sanford Plant were supplied by the Florida SHPO. One site, 8Vo166, is recorded within this tract. This site was severely disturbed during plant construction. Five other sites are recorded within a three mile radius of the Plant. None of the six sites is deemed eligible for listing on the National Register of Historic Places (Percy 1981b).

3.6.4 SHPO Comments - SJRPP

The SHPO reports that the proposed SJRPP site has undergone a systematic professional archaeological site assessment survey with limited testing to record data to permit an evaluation of the significance of the cultural resources present in terms of National Register criteria. The SHPO deemed eight of the sites eligible for the National Register as the St. Johns River Power Park Archaeological District and recommended their preservation or, if this is not possible, mitigation of impacts. The Secretary of the Interior determined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DUVAL COUNTY, FLORIDA
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Figure 3.6-1. Archaeological site location map at the SJRPP site (Rudolph and Wood 1980b).

Site	Size (ha)	Shell	Occupation	Vegetation	Soil Series
8Du634	12.5	yes	700-1500 AD	mixed hardwoods	Ortega
8Du669	8.8	yes	2000-1000 BC 700-1300 AD	mixed hardwoods	Ortega
8Du670	.94	yes	700-1500 AD mid 19th century	mixed hardwoods	Kershaw
8Du671	.02	yes	700-1300 AD	mixed hardwoods	Ortega
8Du672	unk.	no	unknown prehistoric	mixed hardwoods	Ortega
8Du673	1.3	yes	2000-1000 BC 700-1500 AD unknown historic	mixed hardwoods	Kershaw
8Du674	1.2	yes	700-1300 AD	mixed hardwoods	Ortega
8Du675	.01	no	700-1500 AD	mixed hardwoods	Kershaw
8Du676	unk.	no	unknown prehistoric	mixed hardwoods	Ortega
8Du677	.02	yes	unknown	mixed hardwoods	Ortega
8Du678	.03	no	unknown prehistoric	mixed hardwoods	Kershaw

Table 3.6-1. Archaeological site data summary for the SJRPP site (Wood and Rudolph 1980b).

on 30 September 1981 that the archaeological district on the SJRPP site is eligible for listing on the National Register. Additional recommendations from the SHPO include a systematic archaeological site assessment of the final right-of-way for the transmission line corridor. Figure 3.6-2 shows the locations of the SJRPP archaeological sites with notations by the SHPO regarding site preservation and the potential archaeological district. Additional SHPO comments concerning the SJRPP site are included in Section 4.8 and SHPO correspondence is included in Appendix P as Exhibits P-1 and P-2.

3.7 EXISTING SOCIAL AND ECONOMIC CONDITIONS

The analysis of existing socioeconomic conditions focuses primarily on two areas: the SJRPP/NGS project region and the FP&L Sanford Plant project region. Because the locations associated with the other alternatives are not limited to specific sites or communities, the socioeconomic anaylsis of existing conditions is restricted to these two regions. A detailed discussion of socioeconomic conditions is presented in Appendix Q.

3.7.1 Existing Social and Economic Conditions of the SJRPP/NGS Project Region

The primary impact area of the SJRPP/NGS projects is considered to be the City of Jacksonville and Duval County. This area will be referred to as the project area. The six surrounding counties which include Baker, Clay, Flagler, Nassau, Putnam, and St. Johns Counties are considered to be secondary impact areas and will be referred to as the project region. The following analysis identifies the existing social and economic conditions of both the project area and project region which could be affected by the proposed SJRPP/NGS projects.

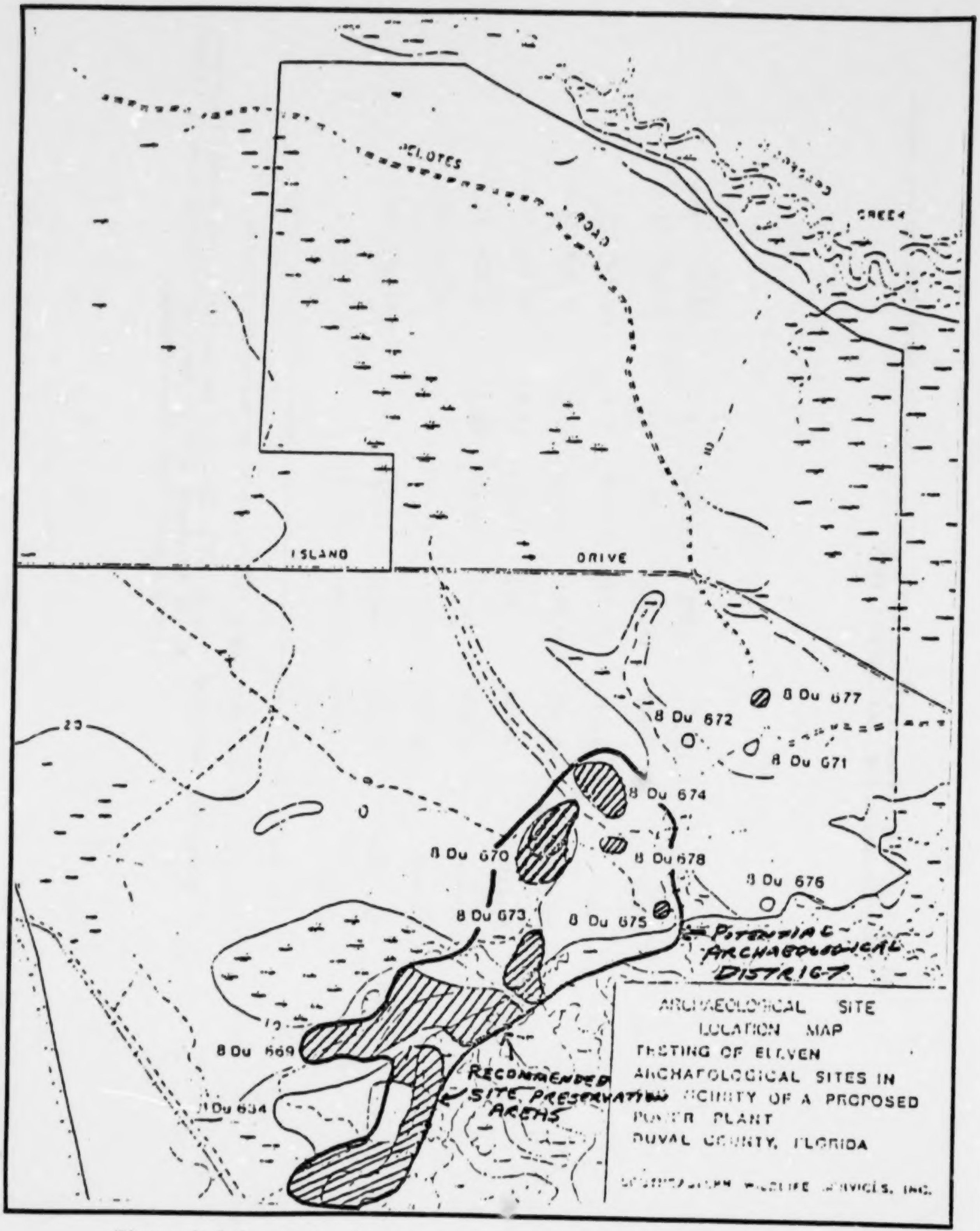
3.7.1.1 Population Levels

The population of the seven counties of the SJRPP/NGS project region grew from approximately 662,705 in 1970 to 798,981 in 1980, an increase of about 20.5%. The population of this region is expected to reach 1,116,684 by the year 2000 with Duval County continuing to be the most densely populated county throughout the time period. Duval County is not expected to experience the greatest rate of growth, however; instead, Flagler County is expected to increase in population by 300% and Clay County is projected to increase over 250% by 2000 (Table 3.7-1).

The most densely populated areas within a five mile radius of the proposed site are located south of the St. Johns River. The majority of the area within five miles of the proposed project is rather sparsely populated and lies north of the St. Johns River. The 1980 population within this five-mile radius was estimated by the Jacksonville Area Planning Board to be 20,800 with a projected growth to 33,120 by the year 2000 (JEA/FP&L 1981a).

3.7.1.2 Economic Conditions

Employment in the project region from 1970 to 1978 increased at a rate slightly greater than the nation. The growth of employment for the State, however, occurred at a rate slightly higher than that of the project region. The growth of the civilian labor force of each county in the project region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8 Du 673
8 Du 675
POTENTIAL ARCHAEOLOGICAL DISTRICT
8 Du 669
8 Du 634
RECOMMENDED SITE PRESERVATION AREAS
ARCHAEOLOGICAL SITE
LOCATION MAP
TESTING OF ELEVEN
ARCHAEOLOGICAL SITES IN
VICINITY OF A PROPOSED
POWER PLANT
DUVAL COUNTY, FLORIDA
SOUTHEASTERN WILDLIFE SERVICES, INC.

Figure 3.6-2. Archaeological site location map at SJRPP with notations by Florida SHPO (Percy 1981a).

Table 3.7-1. Population estimates and projections for the SJRPP/NGS project region, 1970-2000 (USDOC 1981 and JEA/FP&L 1981a).

	1970[a]	1980[a]	1990[b]	% +	2000[b]	% +
Baker	9,242	15,289	20,564	34.5	24,965	21.4
Clay	32,059	67,052	95,415	42.3	115,738	21.3
Duval	528,865	570,981	657,199	15.1	739,349	12.5
Flagler	4,454	10,913	15,911	45.8	19,316	21.4
Nassau	20,626	32,894	45,558	38.5	55,216	21.2
Putnam	36,424	50,549	64,501	27.6	78,110	21.1
St. Johns	31,035	51,303	69,413	35.3	83,990	21.0
Total	622,705	798,981	968,561		1,116,684	

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[a] Years 1970 and 1980: Data from the 1980 US Census for Florida.

[b] Years 1990 thru 2000: Determined by applying the projected percentage increase of the Northeast Florida Regional Planning Council (NEFRPC) to the updated 1980 Census figures.

varied greatly with the labor force of Duval County increasing 20% (232,630) by 1978 while Flagler's more than doubled (3,450). Overall, Flagler and Clay counties showed the greatest rate of growth for this time period although Flagler was the lowest in terms of absolute numbers of individuals (Table 3.7-2).

The rate of unemployment for the project region from 1973 to 1979 has not changed as drastically as for the State or nation as a whole (Table 3.7-3). Over the time period, the national rate increased from 4.9% in 1973 to 8.5% in 1975 and then dropped steadily to 5.8% in 1979. The unemployment rate in Flordia varied even greater than the nation between 1973 and 1975, rising from 4.3% to 10.7%, and then declining to 6.0% by 1979. The rate for the project region also showed significant fluctuation. The rate increased from 4.8% to only 6.7% in 1975, dropped to 6.3% in 1976, increased again to 6.8% in 1977, and then declined to 5.7% by 1979.

The average gross weekly earnings for production and/or nonsupervisory workers from 1970 to 1978 were higher for the project region than for either the State or the nation (Table 3.7-4). The average weekly earnings in the Jacksonville SMSA rose from $122.36 in 1970 to $243.36 in 1978 (98% increase). In contrast, the State average rose from $118.78 in 1970 to $207.36 in 1978 (75% increase), while the national average rose from $119.83 to $203.70 (59% increase). The 1970 per capita income of each county in the region, however, was below the national and State averages. Duval County is expected to maintain the highest per capita income while Baker is expected to continue having the lowest per capita income. Similarly, Duval County has accounted for over 86% of the total personal income of the seven county region since 1970.

Table 3.7-4. Jacksonville SMSA, State, and national average weekly earnings, 1970 and 1979 (US Dept. of Labor 1980 in JEA/FP&L 1981a).*

Area	1970	1978	% Increase
Jacksonville SMSA[a]	$122.36	$243.36	98.9
Florida	$118.78	$207.46	74.6
National	$119.83	$203.70	58.8

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[*] Earnings are for production and/or nonsupervisory workers.

[a] Jacksonville SMSA is the Jacksonville Standard Metropolitan Statistical Area and includes Baker, Clay, Duval, Nassau, and St. Johns Counties.

Table 3.7-2. Estimated and projected civilian labor force for the SJRPP/NGS project region by place of residence, 1970-2000 (NEFRPC 1979 in JEA/FP&L 1981a).

	County							
Year	Baker	Clay	Duval	Flagler	Nassau	Putnam	St. Johns	Total
1970	3,092	9,531	220,070	1,470	7,143	13,091	11,058	265,455
1978	5,220	21,540	232,630	3,450	12,500	16,590	15,620	307,550
1980	5,950	25,520	254,060	4,290	14,050	17,260	18,120	339,250
1985	7,590	34,030	275,910	6,020	17,640	19,930	22,450	383,570
1990	9,050	39,700	296,250	7,010	20,550	23,130	26,390	422,080
1995	10,300	44,750	316,880	7,910	22,770	25,955	29,310	457,875
2000	11,630	49,740	336,530	8,840	25,150	28,820	32,490	493,200

Table 3.7-3. Regional, State, and national unemployment trends 1973-1979 (US Dept. of Labor 1980 in JEA/FP&L 1981a).

	Percent Unemployment						
Area	1973	1974	1975	1976	1977	1978	1979
National	4.9	5.6	8.5	7.7	7.0	6.0	5.8
Florida	4.3	6.2	10.7	9.0	8.2	6.6	6.0
SJRPP Region - 7 Counties	4.8	5.1	6.7	6.3	6.8	6.1	5.7
Baker	3.0	3.9	6.3	5.7	5.4	5.1	3.7
Clay	3.7	3.6	5.1	4.4	4.2	4.7	4.3
Duval	4.9	5.0	6.6	6.4	6.9	6.1	5.6
Flagler	2.0	5.9	8.8	9.1	7.9	5.8	5.5
Nassau	3.9	3.6	5.9	5.4	6.0	5.6	5.3
Putnam	3.3	6.2	8.1	6.7	8.4	7.1	7.6
St. Johns	6.9	8.1	9.6	7.0	8.8	7.7	7.4

3.7.1.3 Community Services

Major project-related impacts on community services and facilities are expected to occur in Jacksonville/Duval County. While there may be some secondary impacts realized in other counties of the project region, it is not expected that their public or private services and community infrastructure will be directly affected by the SJRPP/NGS projects. Consequently, this analysis only addresses the community services of Jacksonville/Duval County.

Water Supply and Wastewater Treatment

The Jacksonville/Duval County public works service function includes sewage, water, and sanitation services. At present, each component is operating with excess capacity. The sewage component has a current service level capacity of approximately 71.1 million gallons per day (mgd) while the current demand is about 50.7 mgd or an excess of approximately 21 mgd. The current service level capacity of the water component is about 178.3 mgd while the current resident demand is approximately 57.1 mgd or an excess of over 121 mgd. The current service level capacity of the sanitation component is 1,112,800 total pounds per day. Resident demand for this public service function is about 863,920 total pounds per day, resulting in an excess capacity of approximately 248,880 total pounds per day (Duval County Public Works Department 1979 in JEA/FP&L 1981a).

Public Safety

The public safety service function includes law enforcement and fire protection. Based on US Department of Commerce standards, the law enforcement component for 1979-80 has adequate personnel to meet public demand in the Jacksonville/Duval area. A city of this size reportedly requires 1,325 enforcement officers and support personnel to satisfy the public demand. Jacksonville/Duval County currently has a staff of 1,485 which actually represents an excess of 160 full-time personnel (JEA/FP&L 1981a).

The fire protection component is also currently operating well within protection standards for a city of this size. The Jacksonvill/Duval County Fire Department has a first due response radius of 2 miles or less for engine companies and 3 miles or less for ladder companies with each having a pumping capacity of 500 to 1,500 gallons per minutes (Duval County Fire Department 1980 in JEA/FP&L 1981a).

Education

The public school system of Jacksonville/Duval County currently has the physical capacity to accommodate the projected total enrollment of approximately 102,600 students for the 1980-1981 school year. The current physical capacity of the school system in pupil stations is slightly more than 107,000, resulting in an excess of approximately 4,400 pupil stations (Duval County Public School System 1980 in JEA/FP&L 1981a). There are also approximately 60 private and parochial schools located in Duval County. These schools range from 3 grades to 13 grades (K-12) and include two special education centers (Jacksonville Area Planning Board 1979 in JEA/FP&L 1981a). The Jacksonville area also has several postsecondary educational institutions.

Health Care

Based on US Department of Commerce standards, a city of Jacksonville's size should maintain a public health staff of approximately 750 personnel. At present, the public health service function of Jacksonville/Duval County has a staff of only 165, resulting in a deficiency of approximately 590 personnel (JEA/FP&L 1981a). One explanation for this public health service deficiency could be the abundance of non-public health facilities (hospitals) in the City. The various private hospitals in Jacksonville/ Duval County are currently maintaining a service level of approximately 1,065,000 patient days. With a current resident demand of about 779,200, this equates to a current excess of approximately 286,000 patient days or a 73% capacity level. The capacity benchmark utilized by a majority of the area's hospitals is 80% (JEA/FP&L 1981a).

Housing

At present, there are approximately 223,000 total available housing units in Jacksonville/Duval County (JEA/FP&L 1981a). The types of housing units considered in this analysis are single family homes (owned or rented), apartments, and mobile homes. The resident demand for housing in Jacksonville/Duval County is approximately 211,800 which results in a current housing surplus of over 11,000 units (Jacksonville Area Planning Board 1978 in JEA/FP&L 1981a). The predominant type of residence in Duval County is single-family units, comprising 64.3% of the total housing stock (JEA/FP&L 1981a). Mobile homes account for 6.7% of the total stock while multi-family dwellings make up the remaining 20%. Of 211,506 units surveyed in 1976, 94.4% were determined to be in standard condition, 3.9% were substandard but suitable for rehabilitation, and the remaining 1.7% were substandard beyond repair (JEA/FP&L 1981a). The apartment boom of the early seventies created a larger supply of multi-family units than demand could support, resulting in a high vacancy rate. This rate has lessened somewhat over the past few years, but is still quite high compared to single family units. Data for October 1979 reveal a vacancy rate of 1.9% for single family homes while multi-family units exhibit a vacancy rate of 5.0% (Jacksonville Area Planning Board 1980a in JEA/FP&L 1981a).

3.7.2 Existing Social and Economic Conditions of the FP&L Sanford Plant Project Region

FP&L's Sanford Plant is located in southwestern Volusia County near Lake Monroe. Because the power station is located near the borders of Lake County, Seminole County, and Orange County, all four counties are considered to be part of the Sanford project region. Cities near the plant include Sanford, Orlando, Orange City, and Eustis. Table 3.7-5 presents the population of these cities in the project region for 1970 and 1980 and their relative rates of growth.

Table 3.7-5. Population of communities near the FP&L Sanford Plant, 1970-1980 (USDOC 1980).

Locale	1970	1980	% Increase
Sanford	17,393	23,176	33.2
Orlando	99,006	127,725	29.0
Orange City	1,777	2,795	57.3
Eustis	6,772	9,202	36.9

Because of the size of these cities, their projected growth, and the anticipated project population influx for each city, only the cities of Sanford and Orlando are expected to experience any sizable influx in population from conversion of the Sanford Plant. Consequently, the social and economic analysis of the Sanford alternatives will be limited primarily to these two areas. While Orlando could well receive the greatest influx of immigrant workers, this influx is not expected to exceed 560 people. Such an influx would consititute a very slight increase in Orlando's population and is not expected to greatly affect the community. The influx of immigrant workers to Sanford, however, is proportionately larger and could have impacts upon the community.

3.7.2.1 Population Levels

From 1970 to 1980, the population of Sanford grew from 17,393 to 23,176, an increase of about 33%. The population is expected to continue to increase through the year 2000 although at a lesser rate. By 2000, the City should have a population of at least 28,000. Like Sanford, Seminole County is expected to increase in population. The County grew from 83,692 in 1970 to 179,752 in 1980. This growth is expected to continue through 2000 when the County population should be about 310,000. The City of Orlando grew 29% over the ten-year period from 99,066 in 1970 to 127,725 in 1980 (USDOC 1981). This growth should continue until 2000 when the population is expected to be about 148,000. The populations of surrounding counties also grew from 1970 to 1980 although Seminole County's growth rate was the greatest. Table 3.7-6 identifies the population growth of the four county project region during this ten-year period.

3.7.2.2 Economic Conditions

The labor force in Sanford was estimated to be 6,786 in 1970 and was expected to grow to 8,867 by 1980. The growth in baseline employment should continue until it reaches 10,306 by 1990 and over 11,000 by the year 2000 (ECFRPC 1977). While Sanford's employment is expected to continue increasing, the expansion is not projected to be as great as that for the whole County.

Table 3.7-6. Population of the FP&L Sanford Plant project region, 1970-1980 (USDOC 1981).

	1970	1980	% Increase
Volusia County	169,487	258,762	52.7%
Seminole County	83,692	179,752	114.8%
Orange County	344,311	471,660	37.0%
Lake County	69,305	104,870	51.3%
Total	669,795	1,015,044	52.2% +

While all areas show employment growth through 2000, Seminole County's growth rate is expected to be higher than the Orange County rate. Orange County, however, will continue to have a greater absolute number of people employed.

The median family income for the City of Sanford is generally lower than that for Seminole County or for the City of Orlando and Orange County. While the level of Sanford's median family income is not as high as that of the County, its rate of growth has been greater. Sanford's median family income is estimated to have grown from $6,687 in 1969 to approximately $8,458 in 1979, an increase of 26.5% over the ten-year period (ECFRPC 1977). In comparison, however, the rate of increase for all of Seminole County was only 22.4% while Orlando's ten-year growth rate was only 20.7%. According to 1970 Census data, the median income for families in the State of Florida was only $8,267. The percentage of families with incomes less than the poverty level for the State was 12.7% while the percentage for Seminole County was 11.8%. From such statistics it appears that the existing economic conditions for Sanford and Seminole County are similar to that of the State, with slightly higher incomes than the State median (Clark, Dietz, and Associates, Inc. 1977).

3.7.2.3 Community Services

The influx of construction and operation workers associated with the Sanford Plant conversion may cause impacts to surrounding communities and may affect their ability to provide adequate public services. The two communities expected to receive the most significant influx of people are Orlando and Sanford. Because the influx is expected to represent such a small percentage of Orlando's population, community services in Orlando are not expected to be greatly affected. The major areas of Sanford's services which may be subject to changes include water supply and wastewater treatment, education, public safety, health care, and housing.

Water Supply and Wastewater Treatment

According to the 1977 201 Facility Plan for Sanford, Lake Mary, and North Seminole County, the total water use from all these areas including commercial, institutional, industrial, and residential areas is about 89.56 gallons per capita per day. The Floridan Aquifer is the principal source of fresh water for domestic, commercial, and industrial use in this area. It has been estimated that 300 mgd are available for human use (Knochenmus and Beard 1971). The amount of per capita sewage flow plus non-correctable infiltration/inflow is estimated to be about 130.50 gallons per day. Thus, for purposes of planning, the overall total sewage flow has been estimated at 105 gallons per capita per day. The secondary treatment process for the Sanford wastewater treatment plant was designed to handle a maximum flow of 8 mgd and to treat an influent for a population equivalent of 30,000.

Public Safety

Sanford is served by the Sanford City Police Department which currently has a total of 51 officers. The outlying areas of unincorporated Seminole County are served by the County Police Department which has a force of 113 officers (Rice 1981). Fire protection services are provided by the Sanford City Fire Department. The Department currently has two stations and a fire fighting force of 39 with four engine companies, one ladder company, and two rescue vehicles. The Department has an insurance rating of 5 (Harrison 1981). If requested by the City of Sanford, the Seminole County Fire Department will assist in providing fire protection services. The County fire fighting force totals 84 and has an insurance rating of 7 (Poole 1981).

Education

Over the next twenty years Sanford is expected to experience a decline in the number of children enrolled in its public school system. As estimated by the East Central Florida Regional Planning Council, Sanford's 1970 school enrollment was 4,832 for grades 1-12. Enrollment projections indicate, however, that such a level will not be attained again through the year 2000. By 2000, Sanford's enrollment is projected to be only about 4,793. While the Sanford area is expected to experience a decline in school enrollment, Seminole County as a whole is projected to undergo an increase in school enrollment. By the year 2000, Seminole County should have approximately 64,400 students enrolled, an overall increase of almost 200% from 1970. Likewise, Orange County is expected to increase in enrollment although the City of Orlando should experience a relatively constant enrollment from 1985 through 2000.

Health Care

Health care services for Sanford and the surrounding area are provided by local physicians, public and private health care clinics, and two hospitals. Facilities offering health care services include the Central Florida Migrant and Community Health Center, the Seminole Mental Health Center, and the Seminole County Health Department. Located directly in Sanford is Seminole Memorial Hospital which has 196 beds with an occupancy rate of approximately 75%. A total of 55 physicians actively serve the hospital. Construction for expanding the hospital is currently in progress. Also located nearby in Altamonte is a branch of Florida Hospital known as the Florida-Altamonte Hospital.

Housing

According to 1980 Census data for Florida, Sanford is estimated to have a total of 9,035 housing units by 1980, an increase of 47.4% from 1970. The total number of units for all of Seminole County in 1980 is reported to be 68,154, an increase of about 140% for the whole County over the ten-year period. The County's growth in housing was even greater than the growth rate for the State as a whole which had a relatively high increase of 73%. Orange County and Orlando likewise experienced increases in housing units although neither growth rate was as high as Seminole County's or the State's. According to the preliminary count for the 1980 Census, the housing vacancy rate was 7% for Seminole County and 7.5% for the City of Sanford (Beamer 1971).

3.8 LAND USES, RECREATIONAL RESOURCES, AND AESTHETIC CONDITIONS

This section addresses the existing land uses, recreational resources, and aesthetic conditions of the areas surrounding the SJRPP and NGS sites and the Sanford Plant. Because the other alternatives considered are not restricted to specific sites and communities, a detailed analysis of existing conditions for any other affected areas is not presented. A detailed analysis of land use, recreational, and aesthetic resources is presented in Appendix R.

3.8.1 SJRPP and NGS Project Area

The primary impact area of the SJRPP is considered to be Jacksonville/Duval County. This area is referred to as the project area. The six surrounding counties which include Baker, Clay, Flagler, Nassau, Putnam, and St. Johns Counties are considered to be secondary impact areas and are referred to as the project region. Land use in the seven county SJRPP project region is predominantly agricultural with approximately 233,650 acres (82%) devoted to this use. Other land uses in the region include residential; commercial; industrial; transportation; communication and utilities; institutional; recreational; and extractive (Table 3.8-1). The greatest urban-related use in the Northeast Region is residential land use (approximately 102,930 acres or 4%). Low density developments are located primarily near the St. Johns River and transportation corridors throughout the region. Medium and high density residential areas are found along the coast and near downtown Jacksonville as well as St. Augustine, Jacksonville Beach, and Atlantic Beach.

In contrast to the region, Duval County has only 58.8% of its land in agricultural uses. The most predominant land use in Duval County is residential comprising 58,247 acres (11.8%) while industrial, institutional, and commercial uses constitute 36,950 acres or approximately 9% of the total land area (Jacksonville Area Planning Board 1977a in JEA/FP&L 1981a).

3.8.1.1 Existing Land Cover

The land cover within the five mile radius of the proposed SJRPP and NGS sites is predominantly forest. A total of 16,686 acres (33%) is made up of woodlands and hardwood swamps. Of this total, 13,582 acres are woodlands suitable as commercial forest while the remaining acreage is considered natural woodlands. The second largest land cover is open water with 10,570 acres (21%) included in this category. The St. Johns River and Mill Cove

Table 3.8-1. Existing land use acreage - Northeast Florida region (Jacksonville area Planning Board 1977a in JEA/FP&L 1981a).

Land Use Classification	Baker	Clay	Duval	Flagler	Nassau	Putnam	St. Johns	Total N.E. Region
Residential[a]	2,678	11,382	58,247	1,774	7,316	10,304	11,234	102,934
Commercial & Services	84	845	5,754	244	416	534	740	8,617
Industrial	83	674	4,819	110	300	545	446	6,978
Transportation[b]	3,849	4,284	20,677	3,296	5,167	4,288	54,564	47,125
Communication & Utilities	321	175	843	39	42	1,145	176	2,741
Institutional	315	67,991	26,378	188	255	729	673	96,530
Recreational[c]	161	1,884	6,660	264	1,861	525	791	12,146
Mixed	-	-	318	-	63	430	11	822
Extractive	182	3,891	2,214	-	76	666	-	7,029
Total Developed	7,674	91,126	125,909	5,916	15,495	19,166	19,637	284,922
Total Land Area	374,144	379,520	490,048	311,872	416,000	498,368	387,008	2,856,960
Developed as % of Total Land	2.1	24.0	25.7	1.9	3.7	3.8	5.1	10.0
Agriculture	357,562	346,971	288,240	282,378	348,452	379,452	333,306	233,652
Agriculture as % of Total Land	95.6	91.4	58.8	90.5	83.8	76.2	86.1	81.8

[a] Includes local streets right-of-way.
[b] Includes an estimated 11,316 acres of rights-of-way.
[c] Excludes national forest and/or swamp lands and game management areas or refuge.

Note: Columns may not total exactly due to rounding.

constitute the majority of this land classification. Coastal lands comprise the third largest land cover category incorporating 6,780 acres (13.5%) of which marshes constitute the majority.

3.8.1.2 Existing Land Uses

The land use within a five mile radius of the proposed plant is concentrated primarily in the northern half of Duval County located near the St. Johns River and Blount Island. Land use in the vicinity of the proposed plant is highly related to uses of the St. Johns River and is expected to continue in such related uses (Table 3.8-2). Demands are heavy for that land which is easily accessible to the River. These demands are primarily for industrial, commercial, residential, and recreational land uses.

The proposed site is currently zoned for heavy industrial use which may include, by exception, power plant siting. The land contiguous to the north, west, and south of the proposed site is zoned industrial as well. Marsh land to the east of the site is preserved and protected as hurricane buffers, wildlife refuges, runoff retention areas, propagation ground for marine life, and scenic resources and recreational areas. Approximately 1,880 acres of the total land in the five mile radius is currently identified as industrial use. Industries are locating in this area not only because of the St. Johns River, but also because of the proximity to interstate highways and the Jacksonville International Airport.

Residential land use constitutes 11.2% of the total land in the five mile radius. Various residential districts have developed in this area, one a residential community along Heckscher Drive, another located between 2 and 4 miles northwest of the SJRPP site, and another located south of the River about 4 miles from the site. The closer residential areas are a mixture of house trailers and single-family dwellings of varying conditions and ages. The area farther from the site is separated by commercial districts and consists primarily of well-maintained, middle to upper income dwellings.

The land on Blount Island is currently developing in water-related industries. The land on this island offers industries accessibility to the St. Johns River and the Atlantic Ocean and thus has become a center of industrial development for which a waterfront is an essential feature.

3.8.1.3 Projected Land Uses

The Northeast Region is expected to experience an increase in urban-related land uses as the decline in agricultural uses continues. However, the growth of urban-related land uses is likely to occur in a restricted pattern. Natural resource factors such as the availability of adequate water supplies may condition the location of such future development. Future land uses within the five mile radius are expected to continue focusing on activities associated with the St. Johns River. Heavy demands are projected for the shores of the River by industry, water-related commercial, and residential land uses. The 2005 Comprehensive Plan by the Jacksonville Area Planning Board calls for port- and water-related industry as well as protected wetland areas in the vicinity of the proposed SJRPP project (JEA/FP&L 1981a). The area along Heckscher Drive from Interstate 95 east to just north of Blount Island is expected to continue developing as industrial and storage facilities.

Table 3.8-2. Existing land use acreage within a 5-mile radius of the SJRPP site (JEA/FP&L 1981a).

Land Usage	Approximate Number of Acres	Percentage of Total Land Area
Cropland	170	0.3
Pasture	1,270	2.5
Agricultural Subtotal	1,440	2.8
Wooded Lands	13,580	27.0
Commercial	70	0.1
Industry	1,880	3.7
Institutional	40	0.1
Single Family	5,530	11.0
Multi-Family Residential	120	0.2
Residential Subtotal	5,650	11.2
Utility	210	0.4
Transporation	130	0.3
Wetlands	2,860	5.7
Open Water	10,570	21.0
Coastal	6,780	13.5
Marine	610	1.2
Recreation	260	0.5
Historical Sites	120	0.2
Wet Wooded	3,100	6.2
Other	2,960	5.9
Total	50,260 ac.	99.8[a]

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[a] Due to rounding, percentages do not total to 100 percent.

By the year 2005, the area of the proposed plant should have experienced major industrial development even without the proposed project. Blount Island is expected to continue developing as a center for water-related industries.

3.8.1.4 Existing Zoning

Land in the primary project area is zoned for industrial and commercial uses. The proposed SJRPP plant site has been zoned for heavy industrial use (IH). Power plants are permissible uses in IH zones if allowed by exception. The Jacksonville City Council enacted Ordinance 80-1290-700 on 24 February 1981 which officially rezones the lands of the proposed SJRPP site to government use (GU) at such time as the JEA acquires the fee simple title to the property. Blount Island is presently zoned for industrial waterfront (IW) for which a coal unloading facility is a permitted use. The Governor and Cabinet of Florida have found that SJRPP is consistent and in compliance with existing land use plans and zoning ordinances.

3.8.1.5 Recreational Resources

Recreational areas in the region center around the coast and the River. Within the five mile radius of the proposed plant is the Fort Caroline National Memorial, a 120-acre reconstruction of a French fort built in 1564. The Jacksonville Area Planning Board estimates that visitation to the Fort averages around 400,000 persons per year (JEA/FP&L 1981a). Also within this radius is Yellow Bluff Fort, an undeveloped State park at the site of Confederate Army gun placements which were used in 1862 to protect Jacksonville from Union gunboats. A number of areas also exist that are not officially designated as parks. These areas are normally used for fishing, sunbathing, and picnicking.

Between 7 and 8 miles from the proposed site are two regional parks. One of these parks is the Kingsley Plantation, a State historic and recreational site located on Fort George Island near the beaches. The Jacksonville Area Planning Board estimates that over 35,000 people visit the plantation each year (JEA/FP&L 1981a). Also located on Fort George Island is the Rollins Bird and Plant Sanctuary. To the east is the 2,500 acre Little Talbot Island State Park. This park provides beach recreation to over 35,000 visitors each year (JEA/FP&L 1981a).

North of Jacksonville on the Florida/Georgia border is the Okefenokee Swamp, a National Wildlife Area. The Swamp is over 40 miles long and 20 miles wide and contains abundant wildlife including rare species of flora and fauna. Also located north of Jacksonville at St. Mary's, Georgia is the Cumberland Island National Seashore. Cumberland Island is a National Park offering camping, hiking, swimming, and fishing in a natural wildlife setting.

3.8.1.6 Aesthetic Conditions

The site of the proposed SJRPP project is a relatively flat area on the eastern boundary of an industrial area and on the western boundary of tidal marshes. The general vista is open to the east due to the marshes. The western vista is comprised of industrial development with forest vegetation located between the developments. Adjacent to the proposed site is the NGS which has three stacks of varying heights. The existing view toward the proposed site is dominated by the buildings, water tower, and stacks of the NGS; the transmission towers and lines associated with NGS; the Offshore Power Systems Crane and shipping cranes on Blount Island; and structures of the St. Regis paper mill.

The viewshed of the proposed site extends mostly to the south because of the St. Johns River and the marshes. Homes located on the southern shore of the St. Johns River are most affected by the view of industrial structures in the area, but tree cover usually blocks the view of these structures. The only major road south of the River that offers a view of the industrial structures close to the proposed site is Fort Caroline Road which runs contiguous up to the marshes and Mill Cove. On the north side of the River approximately 0.5 miles south of the proposed site, a view of the proposed SJRPP plant will be possible from Heckscher Drive. This view is presently dominated by the NGS in the foreground and is typical of the industrialized section of Heckscher Drive. West of the site, the tree cover allows only a limited view of the structures. To the east, the openness of the marsh allows a significant exposure of the NGS from Heckscher Drive.

3.8.2 Sanford Plant and Vicinity

The primary impact area of the proposed alternatives for the FP&L Sanford Plant is the southwestern section of Volusia County near the St. Johns River and Lake Monroe. This area is considered to be subject to the greatest land use changes and will be referred to as the project area. The counties surrounding the project area are considered to be subject to secondary impacts and will be referred to as the project region. These counties include the remainder of Volusia County, Seminole County, Lake County, and Orange County.

3.8.2.1 Existing Land Use Patterns in Volusia County

The area surrounding FP&L's Sanford Plant is predominantly agricultural. Farmland, some of which is prime farmland, exists to the east and west of the Plant. The surrounding area also includes industrial, commercial, residential, recreational, and utility land uses. Approximately 1.5 to 2.0 miles south of the Plant is a development known as the St. Johns River Estates. This development is a residential subdivision and constitutes one of the more concentrated residential areas in the region. Other residential areas such as Meadowlea Estates to the west also exist in the vicinity of the Plant. Along US Highway 17/92, commercial and industrial uses have developed. The area between US Highway 17/92 and the Seaboard Coast Line (SCL) Railroad as well as the east side of US Highway 17/92 is experiencing increased industrial development. Across from the Plant is a County park used primarily for picnicking and overnight camping. A marina and boat access are also located nearby for public recreational use.

3.8.2.2 Projected Land Uses

While the area surrounding the FP&L Sanford Plant is predominantly agricultural, industrial and commercial uses are developing in the area. Particularly along the SCL Railroad and US Highway 17/92, industrial developments are increasing. According to the Volusia County Comprehensive Plan, the County intends to maintain and preserve prime agricultural lands where possible (Volusia County 1980). Consequently, certain lands in the area surrounding the Sanford Plant may be reserved in the future for agricultural uses. Not all land within the region, however, is considered to be prime farmland. Therefore a mixture of industrial, commercial, residential, and recreational uses is likely to develop.

3.8.2.3 Existing Zoning

The existing Sanford Power Plant is located on land zoned for agricultural purposes. In order for FP&L to locate a power plant on this site, a Special Exception was required by Volusia County. In 1979, FP&L also was required to obtain a Special Exception to initiate the experimental coal and oil mixture technology. The Special Exception was granted for one year or 120 burn days. At the present time, this Special Exception has expired and no extension has yet been granted by Volusia County. Any expansion of the existing plant would also require a Special Exception from Volusia County.

Much of the land surrounding the Sanford Plant is also zoned A-1 (prime farmland) or A-2 (agricultural). These agricultural classifications extend east and west from the Plant. Within the five mile radius of the Plant, however, there also exist residential, industrial, commercial, and recreational zones.

3.8.2.4 Recreational Resources

Recreational resources in Volusia County include three major types of areas: (1) high density recreation areas (playgrounds, marina, parking areas); (2) general outdoor recreation areas (campgrounds, nature walks, picnic areas); and (3) natural environment areas (resource areas left in their natural state, historic and cultural sites). Volusia County has a total of 50,000 acres of such recreational resources, 88% of which are owned by the Federal government (Table 3.8-3). It is estimated that approximately 3,400 additional acres of high density recreation areas should be added by 1990 (Volusia County 1980).

Table 3.8.3. Existing recreational lands in Volusia County, 1977 (in acres) (Volusia County 1980).

Ownership	Recreation Class			Total Acreage
	I	II	III	
Federal			44,375	44,375
State	137	3,531	17	3,685
County	156.8	594	-	750.8
City	458.2	731	-	1,189.2
Total	752	4,856	44,392	50,000

3.8.2.5 Aesthetic Conditions

The existing Sanford Plant is located in a predominately rural area with some industrial and commercial development located along US Highway 17/92 and the SCL railway line. To the south of the plant is the St. Johns River with a buffer of trees situated between the Plant and the River. South of the River is the St. Johns River Estates residential area. The southern viewshed of the Sanford Plant which affects this residential development is limited primarily to the taller structures of the Plant including the water tower, stacks, and fuel tanks.

The eastern vista is comprised of industrial and commercial development with mixed vegetation located among the developments. The major road from which a view of the Plant occurs is US Highway 17/92. Because the rail line, vegetation, and developments exist between the Plant and the Highway, most of the view of the Plant is limited to the stacks, water system, and fuel tanks. At the junction of Barwick Road and US Highway 17/92, however, there is rather sparse vegetation which allows a more complete angular view of the Plant from this Highway.

The western vista includes trees, mixed vegetation, and open fields. The view of the plant from Meadowlea Estates to the west is restricted to the taller structures because of the vegetation and open fields. From various parts of Fort Florida Road north of the Plant, the taller structures of the Plant can been seen to the south while Konomac Lake (the cooling pond of the Sanford Plant) can be seen to the north.

3.9 EXISTING TRANSPORTATION

Two study areas were considered in order to determine the existing transportation facilities available to the proposed SJRPP and its alternatives. The first includes the transportation facilities northeast of Jacksonville, Florida which serve or will serve the proposed SJRPP, Blount Island, and the existing NGS. The second area includes the transportation facilities northwest of Sanford, Florida which serve the Sanford Plant. A detailed discussion of both study areas is presented in Appendix S.

3.9.1 Transportation Facilities Serving Jacksonville, Florida

Transportation systems of importance to the Jacksonville area are highways, railroads, airports, and ship facilities (Figure 3.9-1). Major highways include Interstate Highways 10 and 95 and US Highways 1, 17, 23, and 90. Three rail systems serve the area: the Southern Railway; the Atlantic Coast Line Railroad; and the Seaboard Coast Line Railroad. Only the Seaboard Coast Line (SCL) serves the SJRPP area. Major airports include Jacksonville International Airport, Craig Airport, Herlong Airport, and the Mayport Naval Air Field. Major port facilities include Blount Island and the Talleyrand Docks and Terminals.

Roads expected to provide access to the proposed SJRPP site are Heckscher Drive, New Berlin Road, Eastport Road, and Main Street (Figure 3.9-1). Traffic counts indicate that (under existing conditions) all signalized locations and roadways in the area operate at level of service C or better with

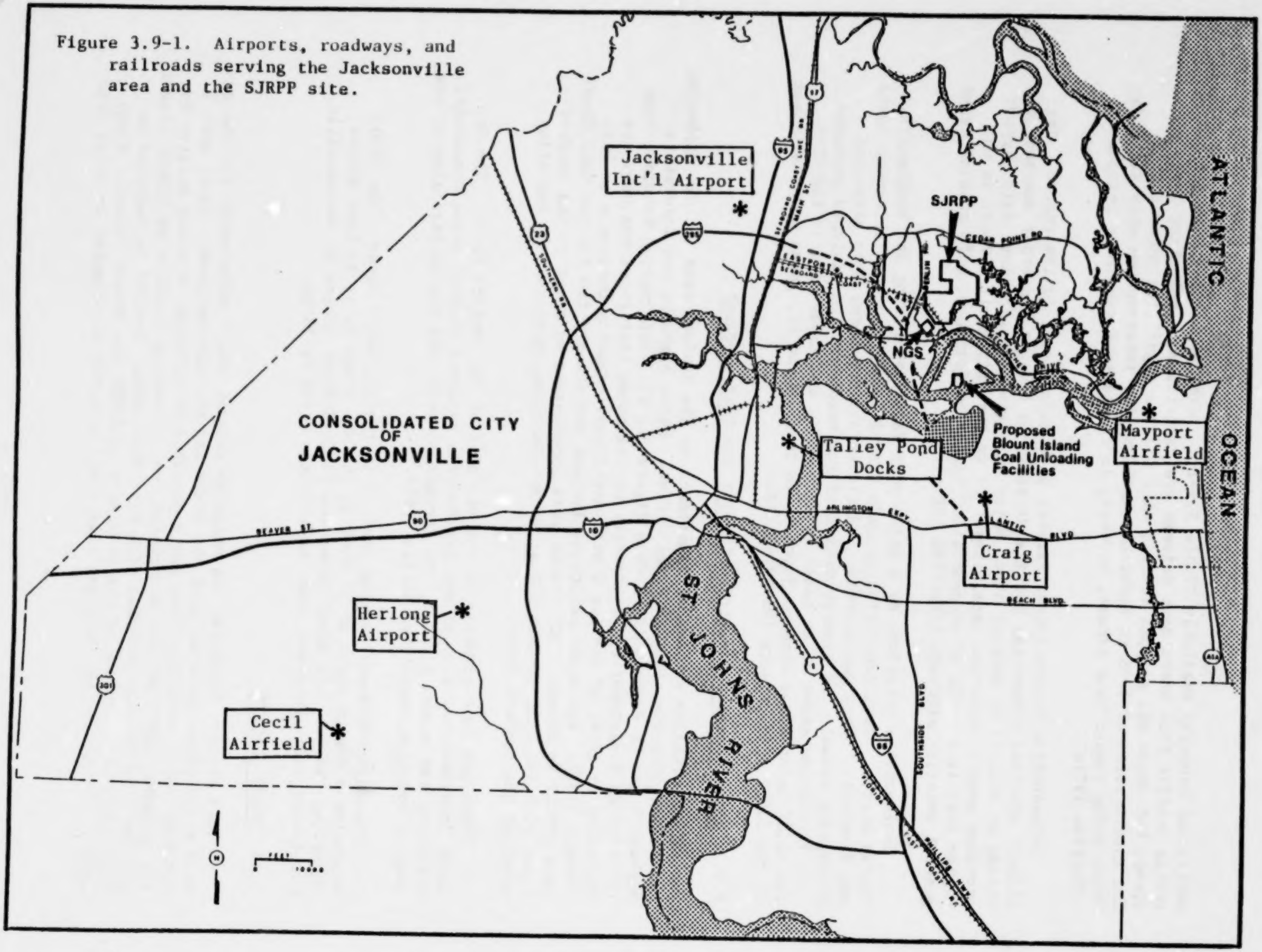
ATLANTIC
OCEAN
SJRPP
NGS
Proposed
Blount Island
Coal Unloading
Facilities
Mayport
Airfield
Jacksonville
Int'l Airport
Talley Pond
Docks
Craig
Airport
CONSOLIDATED CITY
OF
JACKSONVILLE
ST JOHNS RIVER
Herlong
Airport
Cecil
Airfield
CEDAR POINT RD
BEAVER ST
ARLINGTON EXPY
ATLANTIC BLVD
BEACH BLVD
SOUTHSIDE BLVD
SOUTHERN RR
SEABOARD COAST LINE RR
MAIN ST
FLORIDA EAST COAST RR
PHILLIPS HWY
FEET
0
10000
N
95
295
23
90
10
1
301
17
A1A

Figure 3.9-1. Airports, roadways, and railroads serving the Jacksonville area and the SJRPP site.

additional capacity available (Table 3.9-1). Level of service C is defined as stable traffic flow where most drivers are restricted in selecting their speed, but where all stopped traffic will clear a signalized intersection. The intersection of I-95 to Heckscher Road and its intersection with Heckscher Drive going toward Main Street, however, is congested during peak periods (JEA/FP&L 1981a).

Jacksonville International Airport is a major asset to the region. This Airport provides commercial service directly to Atlanta and other southeastern cities as well as to several other major airports. In addition, this Airport provides general aviation facilities. It is the only civil airport in the region that is capable of accommodating higher performance, more sophisticated general aviation aircraft (JEA/FP&L 1981a).

Jacksonville functions as a major port facility serving the southeastern United States. Port facilities include Blount Island and the Talleyrand Docks and Terminals. Many Jacksonville industries are dependent upon barge and oceangoing vessels for transportation of raw materials and finished products. Port facilities serve as an asset in attracting new industries to the City. The USCOE maintains a channel depth of 38 feet in the St. Johns River adjacent to the SJRPP project area (Moulding 1981).

3.9.2 Transportation Facilities Serving the Sanford Plant

Transportation systems of importance to the Sanford area include highways, railroads, airports, and barge facilities. Major highways are Interstate Highway 4 and US Highway 17/92 (see Figure 3.2-2). Information obtained from the Florida Department of Transportation indicates that these roadways are operating at level of service C with additional capacity available on both (Powers 1981). The major railroads include the SCL and the Florida East Coast Line (FECL) Railroads. SCL tracks pass immediately adjacent to the Sanford Plant with the FECL joining SCL at Benson Junction approximately two miles north of the Sanford Plant.

There are five airports in the vicinity of the Sanford Plant. The Orlando International Airport and the Daytona Regional Airport serve commercial aircraft; the Deland Airport, the Herndon Airport, and the Sanford Airport are general aviation facilities (Ellis 1981).

The major waterway serving Sanford is the St. Johns River. The USCOE maintains a design depth of 12 feet in the St. Johns River to Lake Monroe (Moulding 1981). This depth gives the Sanford Plant access to Jacksonville, the Intercoastal Waterway, and the Atlantic Ocean by barge.

3.10 SOUND QUALITY

This section describes the existing ambient sound environment for the two main study areas involved with the SJRPP and the alternatives. Study Area 1 includes noise receptors that could possibly be affected by noise emitted by the proposed SJRPP and its associated coal unloading facility on Blount Island and the alternatives possibly affecting this area. The NGS is included in this study area because of its proximity to SJRPP and Blount Island. Study Area 2 includes noise receptors that could possibly be affected by noise from

Table 3.9-1. 1980 average daily traffic by hour and maximum level of service C volumes on roads providing access to the proposed SJRPP site (Harland Bartholomew and Associates 1980).

	Heckscher Drive	New Berlin Road	Eastport Road	Main Street
6-7 a.m.	602	61	615	1,041
7-8	825	119	567	1,386
8-9	544	63	405	839
9-10	591	85	403	813
10-11	665	127	369	856
11-12	642	112	412	827
12-1 p.m.	633	91	394	909
1-2	626	100	416	950
2-3	791	102	495	1,059
3-4	741	120	528	1,261
4-5	810	159	565	1,292
5-6	708	130	515	1,228
6-7	451	89	400	868
7-8	271	69	282	696
8-9	267	51	266	542
9-10	243	47	216	519
10-11	278	38	228	244
11-12	168	15	136	318
12-1 a.m.	120	16	115	234
1-2	60	4	63	99
2-3	44	7	36	98
3-4	55	6	41	59
4-5	46	10	47	81
5-6	84	15	77	227
TOTAL (ADT)	10,265	1,636	7,591	16,446
LEVEL OF SERVICE C DAILY VOLUMES	28,889	18,521	24,390	61,905

the Sanford Plant. Since the exact location of other alternatives is not specified at this time, no existing conditions will be presented for them. A detailed discussion of sound quality can be found in Appendix T.

3.10.1 SJRPP/NGS Ambient Sound Environment

Noise sources in Study Area 1 include roadways, railroads, industrial plants, and airports (Figure 3.9-1). Heckscher Drive is the major noise producing roadway in the vicinity of SJRPP because of the heavy truck traffic serving industries in the area. Heckscher Drive is also the main road north of the St. Johns River to provide Jacksonville with access to the Atlantic Coast. The Seaboard Coast Line (SCL) Railroad is the only rail line serving the SJRPP directly although two other rail lines serve the Jacksonville area.

Study Area 1 has been zoned industrial by the Jacksonville Area Planning Board (JEA/FP&L 1981a). Several industries which contribute noise to the area are located along the north side of Heckscher Drive from Interstate Highway 95 to the NGS and on Blount Island. The Jacksonville City Landfill is adjacent to the northwest property line of the proposed SJRPP site. The Jacksonville International Airport located several miles northwest contributes aircraft noise to the area.

Noise receptors in the vicinity of Study Area 1 include farms and residences. There are scattered residences along New Berlin Road north of Heckscher Drive, along Cedar Point Road, and along Heckscher Drive east of the NGS. Residential concentrations occur at the Dames Point and New Berlin communities located west of Blount Island and at the Beacon Hills subdivision located across the St. Johns River from the proposed Blount Island coal unloading facility. There is also a small concentration of residences adjacent to New Berlin Road just north of Heckscher Drive. Farms in Study Area 1 are located west of New Berlin Road north of the proposed SJRPP and along Oak Grove Road. Residences that would be affected by increased train traffic to the proposed SJRPP are located near the SCL tracks at Eastport Road.

A noise survey was performed in the winter of 1978 and summer of 1980 to determine the ambient sound environment for the area surrounding the SJRPP/NGS sites and Blount Island. Ambient noise levels are listed in Table 3.10-1 and monitoring stations are indicated in Figure 3.10-1. The noise receptor most likely to be affected by the proposed SJRPP (Station 3) presently receives a noise level of 55 dBA. This noise level is primarily due to garbage trucks on New Berlin Road and heavy equipment operating at the Jacksonville Landfill across New Berlin Road from the residences. The trend toward industrial development will increase noise levels in the area. This trend will also reduce the number of noise sensitive receptors, however.

3.10.2 Sanford Plant Ambient Sound Environment

Major noise sources in the Study Area 2 vicinity include railroads, highways, and dock facilities. The SCL tracks run adjacent to the Sanford Plant. US Highway 17/92 parallels the SCL tracks at the Sanford Plant while Interstate Highway 4 passes the plant approximately one mile to the southeast (see Figure 3.2-2). The Sanford Municipal Docks are located approximately one-half mile south of the Sanford Plant on the south bank of the St. Johns River.

Table 3.10-1. Comparison of winter and summer equivalent (L_{eq}) and day/night (L_{dn}) sound levels in Study Area 1 (JEA/FP&L 1981a).

Station Number[a]	Location	L_{eq} (24) dB(A) Winter	L_{eq} (24) dB(A) Summer	L_{DN} dB(A) Winter	L_{DN} dB(A) Summer
1	New Berlin	56	58	59	62
2	North Site Boundary	53	48	54	56
3	Nearest Residence (NW)	55	54	57	56
4	Nearest Residence (NE)	50	51	52	53
5	Browns Creek	64	61	65	65
6	Northside Station	69	64	71	71
7	Blount Island	-	60	-	65
8	Dames Point	-	62	-	63
9	Beacon Hills	-	52	-	56

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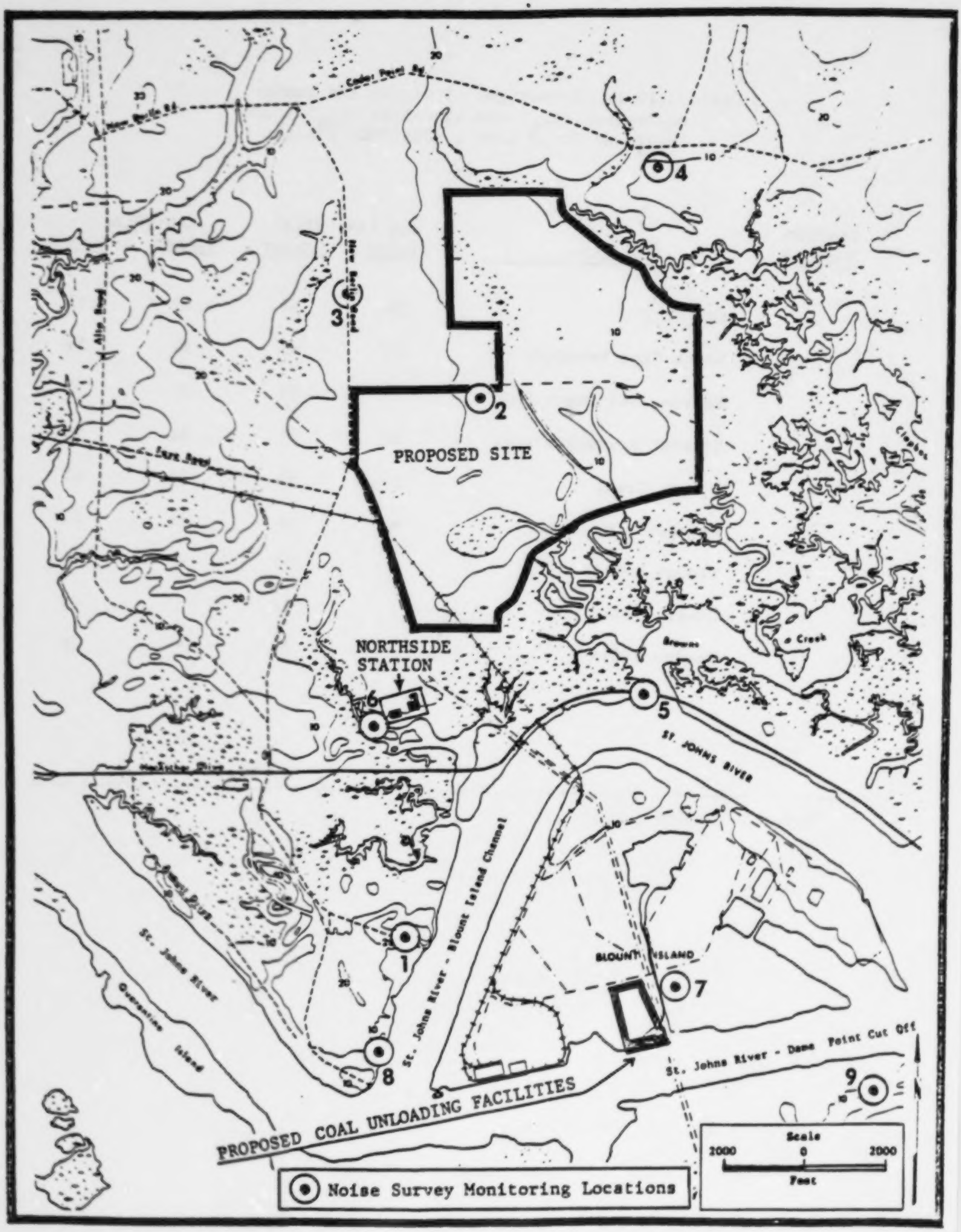
[a] Refer to Figure 3.10-1.



PROPOSED SITE
NORTHSIDE STATION
1
2
3
4
5
6
7
8
9
St. Johns River
St. Johns River - Blount Island Channel
St. Johns River - Dame Point Cut Off
BLOUNT ISLAND
Quarantine Island
Browns Creek
Cedar Point Rd
New Berlin Rd
Alta Road
PROPOSED COAL UNLOADING FACILITIES
Noise Survey Monitoring Locations
Scale
2000
0
2000
Feet

Figure 3.10-1. Locations of monitoring stations for the Study Area 1 noise survey (JEA/FP&L 1981a).

Sensitive noise receptors in Study Area 2 include residences located approximately 2,200 feet northwest of the Sanford Plant, residences located approximately 2,000 feet east of the Sanford Plant between the SCL tracks and U.S. Highway 17/92, and the St. Johns River Estates located approximately 4,300 feet across the River southwest of the plant.

3.11 ENERGY RESOURCES

This section summarizes the existing energy resources in Florida. A more detailed discussion can be found in Appendix U.

3.11.1 Florida

3.11.1.1 Traditional Energy Sources

In 1979, the State of Florida relied on petroleum and natural gas for 84.2% of its energy needs. Petroleum constituted 68.6% and natural gas constituted 15.6% of the total consumption of primary energy. Petroleum consumption is 21.1% higher and natural gas consumption is 19.9% lower as a percentage of total consumption in Florida than in the United States overall. Nuclear energy supplies 7.2% of Florida's needs (Florida Governor's Energy Office 1981).

Transportation accounted for 37.3% of the energy use in Florida in 1979. Only 15.8% of Florida's energy use was by industry. The residential sector accounted for 22.8% of the State's energy use. The total fuel consumption by Florida's electric utilities represented 43.6% of the total energy consumption in the State in 1979 (Florida Governor's Energy Office 1981).

Residential electrical consumption in Florida is 48.4% of the total electrical consumption compared with 33.0% nationally. In Florida homes, air conditioning and water heating are the primary electrical energy consumers. These uses consume a much higher percentage of total residential energy than in other states. Conversely, heating of Florida homes uses far less energy than the national average for heating (Florida Governors Energy Office 1981).

Within Florida there is a heavier reliance on petroleum in the production of electrical energy than in the nation as a whole. Conversely, coal utilization nationally is significantly higher than in Florida. In the production of electrical energy for Florida's consumers in 1979, petroleum was used for 47.4% and coal was used for 18.6% of the energy production. On a national basis, petroleum was only used to produce 14.5% of the electricity while coal was used to produce 46.1% (Florida Governor's Energy Office 1981).

3.11.1.2 Other Energy Sources

Other energy sources are currently being developed in Florida. These include direct solar, indirect solar (primarily wood burning), alcohol, crop residue, and hydropower. These sources represented only 5% (119 trillion Btu's) of the total energy consumption in Florida in 1979. Total energy from direct solar (0.7 trillion Btu's), alcohol (0.2 million Btu's), crop residues (12.6 trillion Btu's), and hydropower (2.5 trillion Btu's) accounts for only 14% of the energy from other sources. The remaining 86% is attributable to wood burning (indirect solar), most of which is done by the pulp and paper industry (Florida Governor's Energy Office 1981).

3.11.2 Peninsular Florida

Peninsular Florida is the portion of Florida east of the Apalachicola River. The utility industry in Peninsular Florida consists of 42 utility systems; 17 utility systems provide nearly 100% of the electric energy generated in the region. In 1980, the net electrical energy capacity in peninsular Florida was 24,457 MW in winter and 23,339 MW in summer. Petroleum and natural gas are used to produce about 56% of this net capability while coal is used to produce about 10% of this net capability. Reserves are projected to be in excess of 25% from 1983 through 1989 without the addition of any additional generating units (FPSC 1981b). In order to allow for scheduled and unscheduled interruptions in output from one or more units, reserve margins must be at least between 20% and 25%. Higher reserve margins are suggestive of excess capacity.

3.11.2.1 FP&L

FP&L is an investor owned utility serving retail customers in 35 counties in southern and eastern portions of Florida. As of 31 December 1980, FP&L served a total of 2,247,688 customers. During 1980, the net energy for load generated by FP&L was used as follows (FPSC 1981b):

• Residential	46.1%
• Commercial	31.8%
• Industrial	6.8%
• Street and Highway Lighting	0.8%
• Sales and Resale	5.6%
• Utility Use and Losses	7.8%

Existing generating capacity and planned additions through 1983 consist of 11 active plants comprised of the following types and numbers of units:

• Nuclear steam	4
• Fossil steam	27
• Solid Waste steam	2
• Gas Turbines	48
• Diesel	2
• Combined cycle	2

Within the FP&L system there are no coal-fired fossil steam plants. Fuels used to produce a total of 45,000 gigawatt hours (GWH) of electricity in 1979 included 54.0% residual oil, 25.6% nuclear, and 18.5% natural gas (FP&L 1980a). As discussed in Section 1.4, FP&L will be in need of additional generating capacity by 1989 (FPSC 1981b).

3.11.2.2 JEA

JEA is a municipally-owned electric utility serving retail customers in Duval County and parts of St. Johns and Clay Counties. As of 31 December

1980, JEA served a total of 224,980 customers. During 1980, the net energy for load generated by JEA was used as follows:

- Residential - 37.3%
- Commercial - 14.1%
- Industrial - 32.9%
- Street and Highway Lighting - 1.2%
- Sales and Resale - 7.7%
- Utility Use and Losses - 6.8%

Existing generating capacity in the JEA system consists of three power plants comprised of 11 oil-fired steam-generating units and 9 gas turbines. In 1980, 9.4 million barrels of oil were consumed. Total energy production from oil amounted to 5,349 GWH. As discussed in Section 1.4, JEA will be in need of additional generating capacity by 1991 (FPSC 1981b).

3.11.3 Natural Gas

Natural gas is provided to the State for residential, commercial, and industrial use by Florida Gas Company. Florida Gas Company controls reserves of 820 billion cubic feet and delivered an estimated 107.9 billion cubic feet of gas to the State in 1979 (Florida Gas Company 1981). At present, the Company's pipeline facilities are running at or near their maximum capacity and the Company has not taken on a major new customer since 1974. Due to the currently low marginal cost of natural gas, JEA is considering converting one of the small units at NGS to burn gas. Due to limitations on pipeline capacity, however, JEA is the only major new gas customer that could be accommodated in the Jacksonville area at this time (Lyles 1981). Unless gas transmission facilities are expanded or gas is discovered in the areas being explored off the northeast Florida coast, gas will not increase in use significantly. This low supply situation may change if natural gas prices are deregulated as currently proposed, but the price increases anticipated with deregulation could dampen demand.

3.11.4 Cogeneration

A small power producing facility which generates its own energy will sell its excess capacity to a utility. A maximum of 226 MW per year is available from cogeneration according to FP&L and JEA (Appendix U). Cogeneration cannot be considered a viable obtain for replacing electricity generated from the proposed project because the costs of cogeneration are as high as costs for oil-generated electricity.

3.12 HUMAN HEALTH

A number of studies on mortality have been carried out on a county-by-county basis for the entire United States and for metropolitan areas of the United States. In addition, analyses have been made on the effects on human health of specific chemical elements and compounds. The results of these studies and analyses are summarized in this baseline health section. A more detailed discussion of human health is presented in Appendix V.

3.12.1 Mortality and Morbidity

The mortality data for Duval, Volusia, and Seminole Counties, State of Florida, and the United States are presented in Table 3.12-1. The data indicate that mortality rates of selected causes during 1978 in Duval County are comparable to national rates except that deaths due to chronic obstructive lung disease and cirrohsis of the liver are higher for Duval, Seminole, and Volusia Counties. The chronic obstructive lung disease group includes bronchitis, emphysema, asthma, and chronic obstructive pulmonary disease. The four causes combined constituted the fifth leading cause of death in 1978 in Florida and in Duval, Volusia, and Seminole Counties. This cause group is probably more directly related to cigarette smoking and/or air pollution than any other with the exception of lung cancer (State of Florida 1978). The death rate due to heart disease and stroke for Duval County during 1978 was lower than for Volusia and Seminole Counties and the State of Florida.

3.12.2 Lung Cancer in the Jacksonville Area

A county-by-county survey of mortality in the United States (1950-1969) revealed that Duval County has one of the highest rates of lung cancer in the United States. An update of the same survey for the period 1970 to 1975 also indicated that lung cancer mortality among white males in Duval County was the highest recorded among all metropolitan counties of the United States, and was greater than the national average by more than 50% (Table 3.12-2). A study (Blot et al. 1981) to identify reasons for the high cancer mortality in Duval County and along the northeast coast of Florida concluded that increased risks on the order of 40% to 50% were associated with employment in the shipbuilding, construction, and lumber/wood industries, particularly among workers with reported exposures to asbestos or wood dust. Excess risks were also linked to fishing and forestry occupations, although the number of cases involved was small. It should be noted that although Duval County leads the nation in lung cancer incidence, the overall cancer rate is lower than Volusia and Seminole Counties and the nation.

Table 3.12-1. Death rates per 100,000 population for selected causes during 1978 (National Center for Health Statistics 1978 and State of Florida Department of Health 1978).

Cause	Duval County	Volusia/Seminole Counties	Florida	U.S.A.
Heart Disease	376.0	550.8	530.4	334.3
Cancer	175.4	239.1	241.3	181.9
Stroke	64.6	110.5	99.1	80.5
Accidents	40.1	44.6	47.8	48.4
Chronic Obstructive Lung Disease	28.7	31.4	32.4	23.1
Influenza	23.2	27.9	27.1	26.7
Cirrohsis of Liver	22.8	16.5	18.5	13.8
Arteriosclerosis	8.4	11.7	13.4	13.3
Diabetes	12.4	16.9	17.2	15.5
Suicide	14.6	18.0	17.1	12.5
Homicide	13.6	9.6	11.4	9.4
Prenatal Condition	11.0	5.6	7.6	10.1
All Causes	840.0	1,075.0	1,103.7	883.4

Table 3.12-2. Listing of the 10 metropolitan[a] counties in the United States with the highest age-adjusted rates of lung cancer mortality among white males, 1970-75[b] (Blot et al. 1981).

	County	Mortality Rate (deaths/yr/10^5)
1.	Duval, Fl.	93.2
2.	St. Louis City, Mo.	90.9
3.	Baltimore City, Md.	88.4
4.	Chesapeake,[c] Va.	87.2
5.	Orleans, La.	86.1
6.	Mobile, Al.	83.8
7.	Jefferson, Ky.	82.8
8.	James City,[d] Va.	80.4
9.	Chesterfield,[e] Va.	79.3
10.	Marion, In.	77.6

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[a] Includes all counties with at least 500,000 person-years of observation among white males during 1970-75

[b] Deaths for 1972 are excluded since not all were ascertained for this year

[c] Includes the independent cities of Norfolk and Portsmouth

[d] Includes the independent city of Newport News

[e] Includes the independent city of Richmond

4.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

This section summarizes the potential impacts of the No Action Alternative, the proposed project (SJRPP), and the four alternatives on the natural and man-made environment. Section 4.1 defines the criteria used to analyze the impacts of all alternatives (including the proposed project) and summarizes the criteria applied to each resource area. The remaining sections summarize potential impacts for each resource area.

4.1 CRITERIA FOR EVALUATION OF IMPACTS

This section describes the criteria and general approach used to evaluate the potential impacts of the proposed project (SJRPP) and the alternatives on the natural and man-made environment. The potential impacts of all alternatives are discussed in Sections 4.2 through 4.13 on a resource by resource basis.

The potential impacts of the SJRPP are analyzed in detail using information presented by the applicant (JEA/FP&L 1981a,b) and large amounts of information and other analyses gathered and performed during the course of the preparation of the SAR/EIS. The large amount of information about the site and details of the proposed project allowed a detailed, relatively quantative assessment of impacts to be performed for the SJRPP including estimates of potential changes in the concentration of air and water pollutants in the environment based on modeling. Using this approach, impacts were estimated by comparing the potential changes in the air quality, water quality, and other resource categories to applicable government standards or to known toxicity thresholds. Due to limitations on the amount of information that could reasonably be gathered, however, this type of approach could not be used to identify the impacts of the alternatives. Instead, the relative impacts of the alternatives were identified by comparing their resource requirements and general waste generation characteristics to provide indicators of the level of potential effects on each resource category. The general types of criteria used in this analysis are identified in Table 4.1-1 and their application is explained in each of the impact analysis sections.

In order to understand the use of the criteria in the assessment of impacts, it is necessary to understand several basic assumptions and underlying methodologies. The alternatives to SJRPP were developed for comparison based on their ability to displace oil in the JEA and FP&L systems. Because the alternatives displace oil use, they not only have direct impacts within the area where involved facilities are located (except the No Action Alternative), but also displace impacts in other areas as a direct result of oil usage reduction. This is because the utilities would preferentially use the more economical non-oil-fired sources of electricity, if available, and reduce the time of operation for the more costly oil plants. Therefore, in order to determine the true effect of the various units considered in the alternatives, it is necessary to also take into account the pollutants not generated and resources not consumed at the various oil-fired plants. A similar method was used to determine the net effect or impact of the alternatives on many of the resource areas such as air, water, and solid wastes for which quantified changes in pollutant generation consumption were used as a basis for assessing impacts.

Table 4.1-1. Criteria employed to estimate potential impacts of the four alternatives on each resource area.

Resource Category	Criteria Employed
Air Resources	• Net change in emissions of SO_2, NOx, CO, HC, and particulates.
Surface Water Resources	• Net change in discharge of chloride, heat, trace metals, oil and grease.
Earth Resources	• Net changes in total amounts of groundwater used. • Net changes in total amount of solid waste generated. • Changes in topography. • Net change in landfill area.
Biological Resources	• Number of acres of habitat required for plant sites and solid waste disposal areas. • Net changes in air emissions and wastewater discharges. • Potential occurrence of rare, threatened, or endangered species. • Potential occurrence of wetlands.
Sound Quality	• Predicted increases in equipment noise levels. • Predicted traffic noise levels.
Cultural Resources	• Potential for occurrence of archaeological, historic, or cultural resources based upon criteria of effect defined in 36 CFR 800.
Socioeconomic Conditions	• Changes in influx of population in relation to housing availability and capacity of community services. • Changes in employment (number of permanent and temporary jobs) • Amount of property tax paid by the utilities and employees. • Amount of State educational aid. • Service demands.

Table 4.1-1. Criteria employed to estimate potential impacts of the four alternatives on each resources area (concluded).

Resource Category	Criteria Employed
Land Use, Recreation and Aesthetics	• Degree of changes of existing land use patterns. • Changes in zoning required. • Consistency with comprehensive land use plans. • Total land required. • Changes in recreational uses. • Changes in aesthetic environment.
Transportation	• Changes in coal train traffic • Changes in amount of highway traffic. • Changes in barge traffic.
Human Health	• Net changes in air emissions of criteria pollutants

In order to understand the use of the criteria in the assessment of impacts, it is necessary to understand several basic assumptions and underlying methodologies. The alternatives to SJRPP were developed for comparison based on their ability to displace oil in the JEA and FP&L systems. Because the alternatives displace oil use, they not only have direct impacts within the area where involved facilities are located (except the No Action Alternative), but also displace impacts in other areas as a direct result of oil usage reduction. This is because the utilities would preferentially use the more economical non-oil-fired sources of electricity, if available, and reduce the time of operation for the more costly oil plants. Therefore, in order to determine the true effect of the various units considered in the alternatives, it is necessary to also take into account the pollutants not generated and resources not consumed at the various oil-fired plants. A similar method was used to determine the net effect or impact of the alternatives on many of the resource areas such as air, water, and solid wastes for which quantified changes in pollutant generation consumption were used as a basis for assessing impacts.

Because it was found that an increase in emissions or water requirements at one known location such as NGS might cause reductions in power generation, and thereby pollutant generation at several other locations, it was decided to evaluate changes or impacts on an area or regional basis. This allowed changes in several different locations to be viewed as a whole so that impacts could be better understood and compared. Consequently, scenarios for four areas were developed for comparison: (1) the JEA system; (2) the Sanford facility; (3) the FP&L system minus the Sanford facility; and (4) Florida as a whole.

The JEA system was considered as a whole because of the close geographical location of its three existing generating facilities (Kennedy, Southside, and Northside). Since all JEA facilities are located in Duval County, the interaction of effects from changes in waste generation and emissions throughout the system would be significant to the Jacksonville area. The Sanford facility was isolated from the FP&L system because the conversion of Sanford Units 4 and 5 from oil to coal is a significant aspect of Alternatives 2, 3, and 4. Additionally, the specific changes in the Sanford Plant area could be predicted and assessed. The FP&L system except Sanford was assessed to show changes throughout the FP&L system associated with refuse plants and oil displacement at unknown facilities in the FP&L system. The total Florida category is presented in order to depict the absolute effect of each alternative overall. The displaced pollutant generation for each alternative is directly related to the oil displaced and the operational characteristics of the system. The background information on oil displacement, distribution of the oil displacement, and operational characteristics of the JEA and FP&L systems are presented in Appendix CC.

It is recognized that the generation of power for purchase at Georgia Power's Plant Vogtle would consume resources and generate pollutants. At the outset of this analysis it was assumed that these impacts would not be considered because they are fixed; that is, the plant has already been permitted for construction and the impacts would occur regardless of JEA's purchase of power. It must be recognized, however, that there is no assurance that Plant Vogtle will be completed and licensed to operate. In contrast, the impacts of the SJRPP and the alternatives potentially could occur, but do not at present. Because the impacts of generating the purchased power are not taken into account, it must be realized that in some cases they would tend to mask the effects of the alternatives by making it appear that there is no pollution associated with the generation of the rather sizeable amounts of purchased power.

The net changes in the use of a resource or the generation of a pollutant used in this analysis cannot be construed in all cases to indicate an impact in themselves. The true test of an impact is its effect on the human environment and, as explained previously, this could not be fully determined in many cases due to a lack of information or the limitations of the analysis. Rather, the net changes employed in this analysis indicated changes which, when compared to the criteria and the relative sensitivity of each resource, could be used as an approximate measure of potential impacts.

4.2 AIR QUALITY IMPACTS

This section considers the potential air impacts due to the construction and operation of the SJRPP and each of the four alternatives. Included are discussions of impacts of construction-related emissions, uncontrolled operation emissions, and controlled operation emissions. The No Action Alternative is not discussed since it would cause no net change in emissions in the Jacksonville or Sanford areas.

4.2.1 Construction-Related Impacts

This section summarizes the emissions due to construction activities, mitigative measures, and resulting impacts. The analysis primarily considers the emissions of fugitive dust.

Emissions of air pollutants associated with the construction of a power generating station result from clearing and grubbing, excavation, material haulage and handling, and open burning. These activities are common to most major construction projects. The SJRPP project and its alternatives are therefore assumed to have similar construction-related emissions. Because air emissions from construction activities are difficult to quantify and vary significantly depending on the control measures implemented. No attempt has been made to quantify these emissions. The production of actual emissions is not critical since control measures for construction-related air emissions have been shown to be highly effective.

The primary air pollutant emitted during each phase of construction is fugitive dust. Control of fugitive dust is primarily accomplished by watering and soil stabilization. Stabilization includes paving or laying down a surface (such as rock or shell) which will reduce the opportunity for particles to become airborne. Other measures for fugitive dust control include careful operation of on-site equipment, reduction of vehicle speeds on unpaved areas, and rapid revegetation of cleared areas after construction.

Open burning is another source of air emissions during construction. Typical emissions from burning activities include particulate matter, carbon monoxide, hydrocarbons, sulfur oxides, and nitrogen oxides. The quantity of these emissions depends largely on the amount and moisture content of the material burned. There are no specific control measures for open burning, although to reduce impacts burning should be conducted during periods of good atmospheric dispersion.

Exhausts of heavy machine and truck traffic also are a source of air pollutants. These consist mainly of carbon monoxide, hydrocarbons, nitrogen oxides, sulfur oxides, and particulate matter. These emissions would be minor due the small number of pieces of equipment and their wide distribution over the project site.

Construction-related air quality impacts are expected to be minimal and of short duration if standard mitgative measures are implemented. Fugitive dust production should be minimized through the use of watering, stabilization, good equipment operational practices, and rapid revegetation of cleared areas. In addition, fugitive emissions from construction activities generally consist of large particles which rapidly settle rather than remain suspended for long distances. This rapid settling will keep fugitive dust impacts restricted to the project site in most instances.

Only minor short-term air quality impacts are expected to result from burning since these operations will be conducted only during periods of good atmospheric dispersion. Burning should be conducted in compliance with local and State regulations, however (Section 5.2 outlines appropriate mitigative measures). Because of the mitigative measures which will be employed, it is not expected that vehicular emissions, fugitive dust, or smoke from burning operations will present any significant air quality problems.

The relative level of construction-related emissions can be correlated with the total amount of land disturbed and the length of time that construction takes place. Although Alternatives 1 and 2 involve a larger amount of total land due to the construction of transmission corridors, the proposed project probably would have a greater potential for impacts due to the large amount of land disturbed at the SJRPP site, Blount Island, and the 5 to 6 year construction period involved.

4.2.2 Operation-Related Impacts

This section summarizes the operation-related impacts of the SJRPP and each of the four alternatives. The analysis includes consideration of effects of SO_2, NOx, TSP, CO, and non-methane hydrocarbons.

4.2.2.1 Operational Emissions of SJRPP

Uncontrolled Emissions

The primary sources of air emissions from SJRPP would be the two main steam generating units. Other sources of emissions would include the auxiliary boiler, cooling tower, and fugitive emissions from the coal, limestone, and fly ash handling systems and the FGD system.

The steam generating units (boilers) will have a heat input capacity of 6,144 MMBtu/hr and a maximum coal consumption of 292.6 tons per hour each. The emissions from each of these boilers were calculated assuming worst-case conditions (i.e., coal with maximum sulfur (4%) and ash (9.5%) contents and minimum heating value (10,500 Btu)) (JEA/FP&L 1981a).

Two auxiliary boilers will be used at SJRPP to provide start-up and shutdown capabilities for the main units. Each auxiliary boiler will be fired with No. 2 fuel oil and have a maximum heat input of 127 MMBtu/hr. The emissions from the auxiliary boilers would be small compared to those from the main boilers. The auxiliary boilers will also be operated only on an intermittent basis (annual capacity factor of 5%) and probably not during periods when the two main units are operating. The SO_2 emission rate is predicted to be 203 pounds per hour while the NOx and particulate emission rates are predicted to be 76 and 2.5 pounds per hour respectively (Moehle 1981d).

Fugitive emissions will occur from the coal, limestone, and solid waste handling and storage facilities. The total uncontrolled fugitive emissions from these activities are predicted to be 250 grams per second or approximately 8,682 tons per year. Fugitive particulates (less than 50 microns) from the cooling towers are predicted to be emitted at a rate of 8.4 grams per second (JEA/FP&L 1981a) or 204 tons per year assuming a 70% capacity factor.

Air Pollution Control Systems

The NSPS and Best Available Control Technology (BACT) emission controls proposed for the SJRPP are identified in Section 2.2.5 and are discussed below. Alternative control measures are discussed in Section 2.5.2 and in Appendix K.

Sulfur dioxide emissions from the main boilers for the proposed facilities will be controlled through the use of a limestone flue gas desulfurization (FGD) system. The proposed scrubbing system will have the following characteristics (based on worst-case coal):

- Design removal efficiency - 90%
- Average emission rate (30day) - 0.76 lb/MMBtu
- Maximum emission rate (2 hr) - 1.2 lb/MMBtu

• Number of operating modules per unit at full load	- Three
• Type of absorber	- Spray Tower
• Type of absorber reactant	- Limestone

The FGD system will be designed for 100% availability (including use of the spare module) and will be furnished with a flue gas reheating system. The increased flue gas temperature will increase the plume rise characteristics of the flue gas, as well as help prevent condensation of flue moisture within the stack (JEA/FP&L 1981a).

The particulate emissions from the main boilers will be controlled through the use of an electrostatic precipitator. The characteristics of the eletrostatic precipitator are presented below (assuming worst-case coal):

• Design removal efficiency	99.78%
• Average emission rate	0.03 lb/MMBtu
• Maximum opacity	20%
• Number of precipitators per unit	Two
• Number of electrical fields in direction of gas flow	Six
• Number of electrical bus sections per unit	72

The control technology for nitrogen oxides (NOx) and carbon monoxide (CO) consists of design parameters and operating practices for the steam generator rather than a distinct process or system. In practice, boiler manufacturers optimize their designs to minimize production of NOx and CO. The fuel burning characteristics of the boilers for this project will be designed to limit the NOx emission rate to a maximum of 0.6 lb/MMBtu as required by NSPS and continuous monitoring equipment will be installed to control the boiler air/fuel ratio and to detect the NOx emission levels (JEA/FP&L 1981a). The CO emissions will be determined during performance testing for compliance with NSPS.

Non-methane hydrocarbon emissions are estimated to be on the order of 0.0005 lbs/MMBtu (JEA/FP&L 1981a). No specific control measures are proposed to control emissions of non-methane hydrocarbons due to their anticipated low levels.

Emission controls for fugitive particulates are identified in Section 2.2.5.4. In general, cooling tower drift will be controlled to a level of 0.002% of the recirculated cooling water volume by the use of high efficiency drift eliminators and by controlling the cycles of concentration to 1.5 times. The ship unloading facility will have dry dust collection systems capable of 99.9% control efficiency at the unloader hoppers. All conveyors will be totally enclosed and each transfer point fitted with dry dust collection systems, with the exception of the stacker-reclaimer which will be fitted with a water spray dust suppression system capable of 97% efficiency. The rail car loading facility will be enclosed in a building and fitted with a dry dust collection system. The coal surge pile in the ship unloading area will be treated by wetting agents to acheive a 90% control efficiency.

Control and collection of fugitive dust particulates from the limestone and/or lime addition system for the FGD equipment and fly ash handling system will be accomplished by use of appropriate types of fabric filter dust collectors. Because of their intermittent use and low expected emissions, no control measures are proposed for the auxiliary boilers.

Controlled Emissions

The controlled emissions from the SJRPP will be the uncontrolled emissions with the pertinent control efficiencies applied as previously discussed. Table 4.2-1 depicts the controlled and uncontrolled criteria pollutant emissions from the main boilers. Because no control measures are planned for the auxiliary boilers, the expected emissions are identical to those previously presented (203 lb/hr for SO_2, 76 lb/hr for NOx, and 2.5 lb/hr for particulates). The 21% control of fine particulate emissions from the cooling towers will result in a controlled emissions rate of 8.4 grams per second or 292 tons per year (JEA/FP&L 1981a). The uncontrolled and controlled fugitive emissions from SJRPP are detailed in Table 4.2-2. The emissions presented represent the emissions from the coal, limestone, fly ash, and FGD waste handling systems.

Table 4.2-1. Uncontrolled and controlled emissions from each boiler at the SJRPP[a] (adapted from Moehle 1981d).

	Uncontrolled Emissions (lbs/hr)	Removal Efficiency (%)	Controlled Emissions (lbs/hr)	Controlled[c] Emissions (tons/year)
Sulfur Dioxide	46,690	90	4,669	20,630
Particulates	84,234	99.78	185	1,134
Nitrogen Oxides	3,686	-	3,686[b]	22,603
Carbon Monoxide	307	-	307[b]	1,883
Hydrocarbons	3	-	3[b]	18

[a] Emissions are per unit at 100% load and assuming worst-case fuel characteristics (maximum sulfur and ash contents and minimum heating value).

[b] Controlled and uncontrolled emission rates are the same a since controls for these pollutants are by boiler design and firing practices rather than by a pollutant removal system.

[c] Annual emissions computed using 100% load and 70% capacity factor and represent the total emissions from both boilers.

4.2.2.2 Emissions Resulting from Each Alternative

The alternatives to SJRPP were developed for comparison based on their ability to displace oil in the JEA and FP&L systems. Although the alternatives themselves produce air emissions, each alternative (except the No Action

Table 4.2-2. Uncontrolled and controlled fugitive emissions from SJRPP (Adapted from JEA/FP&L 1981a)

Process	Type	Throughput	Factor	Uncontrolled Emissions (g/sec)	Control	Control Technique	Controlled Emissions (g/sec)
Ship Unloading	Grab Bucket	10,000 Tons/Day	0.4 lb/Ton^{a}	21.019	(99.9%)^{b}	Dry Collection on Hoppers	0.021
Ship Unloading Transfer Points	6 Points	10,000 Tons/Day	0.2 lb/Ton^{c}	63.056	(99.9%)^{b}	Dry Collection	0.063
Ship Unloading Transfer Points	3 Points	10,000 Tons/Day	0.2 lb/Ton^{c}	31.528	(97%)^{b}	Wet Suppression	0.946
Ship Unloading Facility Train	Loading Shed	10,000 Tons/Day	0.4 lb/Ton^{a}	21.019	(99.9%)^{b}	Dry Collection	0.021
Ship Unloading Facility Coal Surge Pile	Active	30 Acres	13 lb/Acre/Day^{a}	2.049	(90%)^{a}	Wetting Agent	0.205
Rail Car Unloading	Rotary Dumper	10,000 Tons/Day	0.4 lb/Ton^{a}	21.019	(97%)^{b}	Wet Suppression	0.631
Coal Handling Transfer Points	2 Points	10,000 Tons/Day	0.2 lb/Ton^{c}	21.019	(99.2%)^{b}	Dry Collection	0.021
Coal Handling Transfer Points	2 Points	3,300 Tons/Day	0.2 lb/Ton^{c}	6.936	(99.9%)^{b}	Dry Collection	0.007
Coal Handling Transfer Points	6 Points	3,300 Tons/Day	0.2 lb/Ton^{c}	20.808	(97%)^{b}	Wet Suppression	0.624
Coal Handling Transfer Points	7 Points	5,000 Tons/Day	0.2 lb/Ton^{c}	36.782	(99.9%)^{b}	Dry Collection	0.037
Coal Storage at Plant	Active	8 Acres	13 lb/Acre/Day^{a}	0.546	(90%)^{a}	Wetting Agent	0.055
Coal Storage at Plant	2 Inactive Piles	15 Acres	3.5 lb/Acre/Day^{a}	0.552	(97%)^{b}	Wetting Agent	0.055
Limestone Unloading	Rail Dumper	750 Tons/Day	0.4 lb/Ton^{a}	1.576	(99.9%)^{b}	Wet Suppression	0.047
Limestone Transfer	1 Point	750 Tons/Day	0.2 lb/Ton^{a}	0.788	(99.9%)^{b}	Dry Collection	0.001
Solid Waste Disposal Area	Active	25 Acres	13 lb/Acre/Day^{a}	1.708	(90%)^{a}	Wetting Agent	0.171
FGD Waste	Landfill	10 Acres	13 lb/Acre/Day^{a}	0.683	(90%)^{a}	Wetting Agent	0.068
			Total	251.088		Total	2.973

[a] PEDCo 1977
[b] Stoughton 1980
[c] USEPA 1979

Alternative) also displaces air emissions as a direct result of oil usage reduction. Due to the geographical dispersion of the various sources of the generated and displaced emissions, it is necessary to discuss the emissions from the standpoint of the net gain or loss within a particular area in order to relate them to air quality impacts. As described in Section 4.1, net emissions will be identified for each of the major impact areas: Jacksonville, Sanford, and other parts of the FP&L system.

The net emissions for each alternative are directly related to the amount and type of fuel burned and the total amount of oil-fired generation that is displaced. Background information on oil displacement, the distribution of the oil displacement, and operational characteristics of the JEA and FP&L systems are presented in Appendix K and Appendix CC.

Alternative 1

Alternative 1 would use a combination of residential solar water heaters, municipal refuse-fired power plants, conversion of NGS Units 1 and 3 to coal-oil mixtures (COM), and purchase of power from Georgia Power's Vogtle Nuclear Power Plant (Section 2.6) to displace an equivalent amount of oil as SJRPP. It is assumed that use of residential solar heaters and purchase of power would result in no emissions.

Emissions from refuse-fired power plants are similar to those from fossil-fuel power plants. One exception is that refuse-fired power plants produce substantial amounts of hydrochloric acid not common to fossil-fueled fired power plants. The predicted emissions from each of the refuse-fired power plants for this alternative are presented in Appendix K and in Table 2.6-3.

Alternative 1 also entails the conversion of NGS Units 1 and 3 from oil to COM. This conversion would result in a 20% derating of these boilers. The net emissions which would result from burning COM in NGS Units 1 and 3 are presented in Appendix K and in Table 2.6-3.

Alternative 2

This alternative entails the purchase of 550 MW from Georgia Power's Plant Vogtle by JEA and the coal conversion of Sanford Units 4 and 5 by FP&L. Because these units would be derated by 10%, FP&L is also assumed to purchase 72.8 MW from Plant Vogtle in order to avoid any loss of total generating capacity. Purchase of power is assumed to generate no emissions; therefore the only consideration for Alternative 2 emissions is the conversion of Sanford Units 4 and 5 to coal.

The air pollution control system and resulting emissions required for the conversion of Sanford Units 4 and 5 are dependent upon the regulations enforced by USEPA and FDER. The major issue is whether the converted units will be subject to the current New Source Performance Standards (NSPS) for this industrial catagory. By law, if USEPA determines that these units are not currently coal capable, the converted units would have to meet NSPS. USEPA has not yet made such a determination, however. Moreover, an amendment to the Clean Air Act has been proposed to exempt voluntary conversions to coal from the NSPS. If the units are not covered under NSPS, they will be regulated by the Florida State Implementation Plan (SIP) emissions limits set by the FDER and approved by USEPA. Because of this uncertainity, the following analysis examines both the NSPS and the SIP cases.

In the SIP case, the units will probably be subject to the current oil SIP. These regulations limit SO_2 emissions to 2.75 lbs/MMBtu and particulate emissions to 0.1 lbs/MMBtu. The SO_2 limits can be met by purchasing low-sulfur coal (approximately 1.65% sulfur). In order to meet the particulate standards, electrostatic precipitators (ESP) will need to be installed. The ESP's will have to remove about 98.42% of the fly ash given a coal with an approximate 9.5% ash content. In addition to the ESP's, FP&L will have to install induced draft fans to overcome the additional pressure drop. A large amount of ductwork will also be needed to connect the ESP's and fans to the air preheater outlet and to the existing stack.

The NSPS limitations will require a more stringent particulate standard (0.03 lbs/MMBtu) and a flue gas desulfurization system to meet the SO_2 limits. The SO_2 limits require 70% removal for coals less than 2.0 lbs/MMBtu, 90% removal for coals above 6.0 lbs/MMBtu, and a 0.60 lbs/MMBtu standard for coals with 2.0-6.0 lbs/MMBtu original SO_2 content. The particulate standard will require larger ESP's and fans to achieve about 99.53% removal. The FGD system is designed based upon a coal with an average sulfur content of 2.76% (4.6 lbs SO_2/MMBtu). The system selected is a limestone wet scrubber with forced oxidation to produce non-commercial grade gypsum.

The net emissions from the combustion of coal at Sanford Units 4 and 5 are presented in Table 2.6-5 and in Appendix K. These rates are used for Alternatives 2, 3, and 4 since the coal conversion of Sanford Units 4 and 5 is considered for each of these alternatives.

Alternative 3

Alternative 3 includes the purchase of 270 MW of power from Plant Vogtle and construction of a new 280 MW coal-fired power plant for JEA, coal conversion of Sanford Units 4 and 5, and purchase of 72.8 MW of Plant Vogtle Power for FP&L. The new 280 MW unit is assumed to have the same general design characteristics as the SJRPP. The plant would also be subject to NSPS. Design characteristics would include construction of an ESP, an open-cycle wet limestone scrubber, similar coal specifications, and a salt water natural draft cooling tower as proposed for SJRPP. The emissions predicted from this facility are approximately 25% of those predicted for the SJRPP and are described in Appendix K and presented in Table 2.6-7.

Alternative 4

Alternative 4 includes the conversion of the Northside Unit 3 from oil to coal, purchase of 319 MW of power from Plant Vogtle for JEA, conversion of Sanford Units 4 and 5 from oil to coal, and purchase of 72.8 MW from Plant Vogtle for FP&L.

For the NGS Unit 3 coal conversion, the required air pollution control equipment is dependent upon the emissions regulations applied to the converted unit (NSPS or SIP as explained under Alternative 2). Under SIP conditions, an ESP will be required along with the associated ductwork, induced draft fan, and ash collection system. The NSPS regulations will require an FGD system in addition to a larger ESP. The FGD system will have the same design as SJRPP's.

The projected emission rates from NGS Unit 3 with coal conversion are presented in Table 2.6-9 and are described in more detail in Appendix K.

4.2.2.3 Operational Impacts of SJRPP

Effects on NAAQS and FAAQS

The possible air quality effects of the operation of the SJRPP on the NAAQS were assessed through computer modeling by JEA and presented in the SJRPP SCA/EID (JEA/FP&L 1981a). This was accomplished by modeling the major pollutant sources in the project area simultaneously with the proposed project and adding values for background to the computer predicted concentrations. This modeling was performed for the criteria pollutants (except lead) for the pertinent time frames for each pollutant (see Table 4.2-3). The short-term (1-hour, 3-hour, and 24-hour) concentrations were predicted using the maximum emissions of each pollutant (maximum load, maximum capacity) from each facility while the annual average concentrations were predicted using the average annual emissions (maximum load, 70% capacity). The results of the modeling showed that there would be no violations of the NAAQS or FAAQS for any of the criteria pollutants. Subsequent to the JEA analysis, FDER conducted an independent modeling analysis of each pollutant which indicated a potential violation of the 24-hour SO_2 FAAQS. The violation of the State SO_2 standard is associated with the operation of SJRPP and three other JEA power plants (Northside, Kennedy, and Southside). These three plants, along with the proposed project, are geographically aligned along a roughly northeast to southwest orientation which causes a maximum interaction of emissions from these facilities to occur when wind blows parallel to this direction. This violation was predicted to occur 2.5 km southwest of the JEA Southside facility (Oven 1981). Because of this violation, JEA remodeled the 24-hour SO_2 emissions, varying the operational modes of its facilities to determine a scenario which would not violate the 24-hour SO_2 FAAQS. It was determined that under maximum load for the JEA system, the violations could be avoided by shutting down the JEA Southside Units 1 and 2 during periods of maximum system usage. JEA has not yet proposed a specific means of mitigating the predicted violation but has indicated its intention to do so. FDER has reserved final determination on the adequacy of any mitigation of the predicted impacts until a specific proposal has been made.

The results of the modeling for compliance with the NAAQS and FAAQS are presented in Table 4.2-3. Values for HC and lead are not presented because emissions of these pollutants were projected to be very low. No violations of the NAAQS or FAAQS are predicted as a result of the operation of the SJRPP.

Effects on Non-Attainment Areas

The entire Jacksonville area is classified as non-attainment for ozone while a portion of downtown Jacksonville is classified as non-attainment for TSP. The extent of the contribution of the proposed plant to the formation of ozone and therefore its impact on the Jacksonville ozone non-attainment areas cannot be estimated through modeling. However, because of the plant's low emission levels (below USEPA's significance levels) of oxidants and hydrocarbons (the primary precursors of ozone), it was assumed by JEA that the impacts of the proposed plant on ozone concentrations in the Jacksonville area will not be significant (JEA/FP&L 1981a).

Table 4.2-3. Comparison of predicted concentrations for the operation of SJRPP with the NAAQS and FAAQS (Moehle 1981d).

Pollutant/ averaging time	Monitored[a] background concentration ($\mu g/m^3$)	Maximum[b] projected concentration ($\mu g/m^3$)	Total concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	FAAQS ($\mu g/m^3$)
SO_2					
3-hour	123	987	1,110	1,300	1,300
24-hour	21	220[c]	241[c]	365	260
annual	11	13	24	80	60
TSP					
24-hour	79	28	109	150	150
annual	37	3	40	75	60
NO_2					
annual	15	10	25	100	100
CO					
1-hour	--[d]	112[e]	--	40,000	40,000
8-hour	--[d]	<110[e]	--	10,000	10,000

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[a] These values do not include contributions from the JEA Northside Plant and the St. Regis Paper Co.

[b] These concentrations include contributions from the proposed JEA steam electric generating station, the existing JEA Northside Plant and the existing St. Regis Paper Co.

[c] Predicted with JEA Southside Units 1 and 2 shut down (Jackson 1981).

[d] CO monitoring data was not available. However, because of the low ambient air concentrations of CO projected, no violations of the NAAQS for CO is expected.

[e] These values were estimated from the projected SO_2 ambient air concentrations based on worst-case operating load and meteorological conditions.

The impact of the plant on the Jacksonville particulate non-attainment area was estimated through modeling and compared with the USEPA "significance levels" which are 1 ug/m^3 for an annual average and 5 ug/m^3 for a 24-hour average. The TSP non-attainment area basically covers the central downtown area and is at its closest point 9.4 km from the proposed plant.

The annual average impact was calculated using the total TSP emissions from the operation of the proposed plant including fugitive dust emissions from the coal handling facilities, coal unloading facility, limestone handling, waste disposal, and cooling towers. The results of the analysis indicate that the annual average TSP impact on the non-attainment area would be less than 1 ug/m^3, the USEPA significance level. The maximum 24-hour TSP impact would be 4 ug/m^3, which is less than the 5 ug/m^3 USEPA significance level. Based on these results, there should be no significant effects on the Jacksonville area non-attainment areas.

Effects on PSD Increment

There are two PSD areas which may be affected by the operation of SJRPP: the Jacksonville Class II area; and the Okefenokee Wilderness Area, a Class I area located approximately 38 miles (61 km) northwest of the proposed project. A PSD assessment must consider all major sources commencing operation after a specified baseline date (25 November 1977 for the Jacksonville area) within 50 km of the project site for Class II increment consumption and within 100 km of the Class I area for Class I increment consumption. The details of the sources considered for these assessments are presented in the SJRPP SCA/EID (JEA/FP&L 1981a).

The results of the computer modeling indicate that there will be no violations of the Class II increment in the Jacksonville area. Table 4.2-4 presents the Class II increment consumption in the Jacksonville area. The results are based on the worst case plant load (100%) and worst case year (1973) resulting from the five year analysis including the impacts from the fugitive TSP emissions. The year 1973 was used for assessment because the meteorological data for that year provided the highest ground level pollutant concentrations of the years analyzed (1970-1974).

Predicted annual average SO_2 and TSP concentrations are far below the allowable Class II PSD increments of 20 ug/m^3 for SO_2 and 10 ug/m^3 for TSP. The highest annual levels were calculated to be 2.0 ug/m^3 for SO_2 occurring 4.0 km northeast of the proposed plant and 2.4 ug/m^3 for TSP occurring 5.0 km south-southeast of the proposed plant.

Since all short-term standards can be exceeded once per year, the highest, second-highest concentrations are used for comparison with standards. The highest, second-highest short term concentrations are used for comparison with short-term increments. The highest, second-highest 24-hour predicted concentration for SO_2 is 44 ug/m^3. This concentration represents approximately 48% of the PSD Class II increment and is predicted to occur 1.2 km northwest of the proposed plant. The highest, second-highest predicted 3-hour SO_2 concentration is 346 ug/m^3, which is approximately 68% of the PSD Class II increment. This concentration was also calculated at a distance of 1.2 km northwest of the proposed plant. The highest, second-highest 24-hour average TSP concentration

Table 4.2-4. Class II increment analysis (Moehle 1981d).

Pollutant/ averaging time	Maximum[a] Class II increment consumption (ug/m^3)	PSD Class II increment (ug/m^3)
SO_2		
3-hour	346	512
24-hour	44	91
annual	2	20
TSP		
24-hour	18	37
annual	2.4	19

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[a] These values include contributions from all increment consuming sources impacting the ambient air quality within 50 kilometers of the proposed new source, including the proposed JEA steam electric generating station. Five years of meteorological data was used in the analysis; therefore, these values represent the highest, second highest concentrations.

Table 4.2-5. Class I increment analysis (Moehle 1981d).

Pollutant/ averaging time	Maximum[a] Class I increment consumption (ug/m^3)	PSD Class I increment (ug/m^3)
SO_2		
3-hour	18	25
24-hour	4	5
annual	<1	2
TSP		
24-hour	<1	5
annual	<1	10

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[a] These values include contributions from all increment consuming sources within 100 kilometers of the Class I area including the proposed JEA electric steam generating station. Five years of meteorological data was used in the analysis; therefore, these values represent the highest, second highest concentrations.

is calculated to be 18 ug/m^3, which represents appproximately 49% of the increment. This concentration occurs 1.0 km west of the proposed plant.

The modeling for the plant impacts on the Okefenokee Wilderness Area Class I area included a preliminary five year analysis assuming the proposed plant operating at 100% load. Year 1973 was found to produce the highest ground level concentration increase at the Okefenokee Class I area. Table 4.2-5 summarizes the results of the PSD Class I modeling for the proposed plant and other increment consuming sources. The predicted annual average SO_2 and TSP concentrations of 1 ug/m^3 are below the allowable PSD increments of 2 ug/m^3 for SO_2 and 5 ug/m^3 for TSP.

Because the short-term Class I allowable increments are not to be exceeded more than once per year, the highest, second-highest short-term incremental concentrations rather than highest predicted values are compared with the allowable increments. The highest, second-highest calculated 3-hour SO_2 concentration at the Okefenokee Class I area was 18 ug/m^3 which represents 72% of the allowable increment. The highest, second-highest 24-hour SO_2 concentration (4 ug/m^3) was calculated to consume approximately 80% of the allowable increment. The highest, second-highest calculated 24-hour TSP concentration was less than 1 ug/m^3 which represents only 10% of the Class I allowable increment.

Other Air Quality Effects

The effects of fugitive dust from coal trains, accidental air emissions releases, and acid rain are addressed in Appendix K. Radioactive emissions are addressed in Appendix U.

Fugitive dust emissions from coal trains in the Jacksonville area are expected to be minimal. An estimated 1% of coal by weight would be lost as fugitive dust over 500 miles with an estimated 90% of the total losses occurring during the first few hours of train transit (JEA/FP&L 1981a). Fugitive dust can also occur as a result of agitated train road bed dust. These sources were modeled to determine if an impact on the TSP ambient air quality standard would occur. The 24-hour average TSP level in the Jacksonville area resulting from the operation of three coal trains per day (a conservative estimate) was calculated to be 22 ug/m^3 at a distance of 100 meters downwind of the railroad tracks under light wind conditions (1 meter/second) and neutral (Pasquill Class C) atmospheric stability conditions. When added to the Jacksonville area background level of 50 ug/m^3, this total is relatively small compared to the National Ambient Air Quality Secondary Standard and Florida Standard of 150 ug/m^3.

The possible air quality effects of the malfunction of the FGD or ESP systems are addressed in this section. Continued operation of a coal-fired power plant without FGD or ESP control is not normally allowed under current Federal regulations. The worst-case scenarios considered, therefore, are the operation of one of the SJRPP units without FGD and a 20% failure of the ESP (the ESP is constructed in 150 sections with a 10% redundancy, therefore, a 20% failure is unlikely). The instantaneous increase in SO_2 emissions due to a FGD unit failure would be 5.5 times the controlled emissions. Assuming a 3-hour down time, the 24-hour peak emissions would increase by a factor of

1.6. A 20% failure of the ESP would result in an instantaneous emissions increase of 24 times the controlled emissions. For a 3-hour down time, the 24-hour emissions would increase by a factor of 3.8. The expected ground level pollutant concentrations which would result from any of these malfunctions would probably be higher than the applicable 24-hour standards depending on the meteorological conditions at the time. However, this would not necessarily constitute a violation because the regulations permit short-term standards to be exceeded for one 24-hour period per year.

The effects of the operation of a single coal-fired power plant on acid precipitation are not well known. It is known, however, that reactions in the atmosphere with SO_2 and NO_2 result in sulfuric and nitric acid formation. These reactions are thought to occur on long distances, with actual acid precipitation occurring several hundred kilometers from the point of the emissions (JEA/FP&L 1981). Presently, there is no method for determining where or to what extent acid precipitation will occur as a result of SO_2 and NO_2 emissions from a coal-fired power plant. The use of FGD systems for SO_2 control and boiler controls for NOx control will, however, minimize the effects of the operation of a coal-fired power plant on acid precipitation. SJRPP will be required to have a FGD system to control SO_2 emission and boilers designed to minimize NO_2 emissions. Therefore, the effects of acid precipitation due to the operation of SJRPP should be minimal.

Net Emissions

No modeling has been performed to estimate the ground level concentrations of pollutants emitted by Alternatives 1, 2, 3, and 4. Therefore, the impacts of the SJRPP are compared to the other alternatives through a comparison of emissions. For impact assessment the emissions for each alternative (including SJRPP) are presented by area including Jacksonville, Sanford, the FP&L system except Sanford, and the total FP&L and JEA systems. The emissions from each alternative are then distributed by area and compared to the emissions which would result from the combustion of the equivalent amount of oil displaced by the alternative. For purposes of comparison it was assumed that the SJRPP would displace 550 MW of oil-generated power in both the JEA and FP&L systems. The projected emissions from the displacement of oil in the JEA system (5,875,000 bbl/yr) and the FP&L system (5,440,000 bbl/yr) are presented in Table 4.2-6.

Table 4.2-6. Emissions from oil-fired plants which will be displaced by operation of SJRPP (tons/year).

Pollutants	JEA Service Area	FP&L Service Area
Sulfur Dioxide	27,922	25,001
Particulates	1,821	1,686
Nitrogen Oxides	5,464	11,994
Carbon Monoxide	617	517
Hydrocarbons	123	114

To compute the net emissions for SJRPP, the oil displaced emissions were substracted from the operational emissions (Table 4.2-1). The net changes in air emissions resulting from operation of SJRPP are presented in Table 4.2-7. The emissions presented in Table 4.2.7 are compared to the other alternatives at the end of this chapter.

Table 4.2-7. SJRPP net emissions* by area (tons/year).

	Jacksonville	Sanford	FP&L (except Sanford)	Total
Sulfur dioxide	+ 708	-	-25,001	-24,293
Particulates	- 693	-	- 1,686	- 2,379
Nitrogen oxides	+17,139	-	-11,994	+ 5,145
Carbon monoxide	+ 1,216	-	- 571	+ 645
Hydrocarbons	- 105	-	- 114	- 219

*Net emissions equal the SJRPP emissions minus the oil displaced emissions.

4.2.2.4 Air Quality Impacts of the Alternatives

The air quality impacts of the alternatives are quantified by comparing predicted net air emissions. The net emissions as presented herein are the predicted air emissions for each alternative minus the air emissions which will be displaced due to the reduction in oil use. Negative net emissions indicate a reduction in emissions as compared to existing conditions while a positive number indicates an increase.

Four scenarios were chosen for impact assessment: (1) the JEA system; (2) the Sanford facility; (3) the FP&L system minus Sanford; and (3) the total JEA and FP&L systems. These scenarios were chosen to assess the various combinations of actions taken for the alternatives. The JEA scenario includes the Jacksonville area and Duval County. This scenario was chosen to compare those actions in the JEA service area including the proposed action, the COM conversion of NGS Units 1 and 3, and the coal conversion of NGS Unit 3. The Sanford scenario addresses the coal conversion of Sanford Units 4 and 5. The FP&L system except Sanford was considered because a portion of the oil displaced emissions due to purchase of power, solar systems, and refuse plants would occur outside of the Sanford area. The total net emissions are used to interpret system-wide changes under each alternative.

Alternative 1

The total oil displaced emissions for the JEA system are the same for each alternative. It is assumed that the oil displaced would be equivalent to the amount needed to produce 550 MW of power (the amount the SJRPP would provide to the JEA system). Based on the existing operational characteristics of the JEA system (Appendix CC), it was determined that 5,875,000 barrels of oil per year would be displaced in the JEA system. The oil displaced emissions for the JEA system are presented in Table 4.2-8.

Table 4.2-8. Oil displaced emissions for the JEA system (all alternatives).

Pollutant	Emissions (tons/year)
Sulfur Dioxide	27,922[a]
Particulates	1,821
Nitrogen Oxides	5,464
Carbon Monoxide	617
Hydrocarbons	123

[a] Based on JEA's system average oil sulfur content of 1.38%, corresponding to the average emissions limitations for the Northside, Kennedy, and Southside Stations (1.98, 1.0, and 1.0 lbs SO_2/MMBtu, respectively).

For Alternative 1, the emissions presented in Table 4.2-8 represent those emissions displaced by the installation of residential solar water heaters in the Jacksonville area, construction of the Duval County refuse-fired power plant, the COM conversion of NGS Units 1 and 3, and the purchase of 307.6 MW of power from Plant Vogtle.

The oil displaced emissions for the FP&L system were calculated in a similar manner as for the JEA system. It was determined that 5,440,000 barrels of oil per year in the FP&L system would be displaced by Alternative 1. These emissions reduced by the displacement of a total of 550 MW of oil-fired power are presented in Table 4.2-9.

Table 4.2-9. Alternative 1 oil displaced emissions for the FP&L system.

Pollutant	Emissions (tons/year)
Sulfur Dioxide	25,001[a]
Particulates	1,686[b]
Nitrogen Oxides	11,994[c]
Carbon Monoxide	571[d]
Hydrocarbons	114[e]

[a] Based on average 1980 FP&L oil sulfur content of 1.35%.
[b] Based on SIP limit of 0.1 lbs/MMBtu.
[c] Based on AP-42 estimate of 105 lbs/1000 gal (0.7113 lbs/MMBtu).
[d] Based on AP-42 estimate of 5 lbs/1000 gal (0.034 lbs/MMBtu).
[e] Based on AP-42 estimate of 1 lb/1000 gal (0.068 lbs/MMBtu).

The figures in Table 4.2-9 indicate those emissions which would be displaced by the installation of residential solar water heaters in the FP&L system, construction of refuse-fired power plants in Seminole, Brevard, Manatee, and Sarasota Counties, and purchase of 365.7 MW of power from Plant Vogtle.

The total displaced emissions for both JEA and FP&L under Alternative 1 are depicted in Table 4.2-10. The net emissions for Alternative 1 are presented in Table 4.2-11. The net values were calculated using the alternative emissions previously presented and the oil displaced emissions presented in this section.

Alternative 2

The JEA oil displaced emissions for Alternative 2 are identical to those presented for SJRPP and Alternative 1. In this case (Alternative 2) these emissions would be displaced by purchase of 550 MW of power from Plant Vogtle.

The FP&L oil displaced emissions result from the coal conversion of Sanford Units 4 and 5 and purchase of 72.8 MW of power from Plant Vogtle. The FP&L displaced power for the conversion of the Sanford Plant and purchase of power is 728 MW (7,200,154 bbl of oil) in this alternative because it was determined that Sanford Units 4 and 5 would be the most suitable units in the FP&L system to convert and that both of the 364 MW net capacity units would probably be converted at the same time (Moehle 1981c). The existing Sanford emissions (i.e., oil displaced emissions), the oil displaced emissions for the remainder of the FP&L system, and the total FP&L oil displaced emissions are presented in Table 4.2-12. These emissions represent the oil displaced emissions for FP&L in Alternatives 2, 3 and 4. The total oil displaced emissions for Alternatives 2, 3, and 4 for the JEA and FP&L systems are presented in Table 4.2-13.

The net emissions for Alternative 1 are presented in Table 4.2-14. The net emissions were calculated by subtracting the oil displaced emissions from the Alternative 2 emissions.

Alternative 3

The oil displaced emissions for Alternative 3 are the same as those for Alternative 2. Alternative 3 is the same as Alternative 2 for the FP&L system. The JEA oil displacement would occur due to the construction of a 280 MW coal-fired power plant and the purchase of 270 MW of power from Plant Vogtle. The net emissions for Alternative 3 were calculated by subtracting the oil displaced emissions from the Alternative 3 emissions. These are presented in Table 4.2-15.

Alternative 4

Alternative 4 is identical to Alternatives 2 and 3 for the FP&L system. The JEA system oil displaced emissions would occur as a result of the coal conversion of NGS Unit 3 and purchase of 319 MW of power from Plant Vogtle. The Alternative 4 net emissions are presented in Table 4.2-16.

Table 4.2-10. Alternative 1 oil displaced emissions for the JEA and FP&L systems* (tons/year).

	JEA	FP&L	TOTAL
Sulfur dioxide	27,922	25,001	52,923
Particulates	1,821	1,686	3,507
Nitrogen oxides	5,464	11,994	17,458
Carbon monoxide	617	571	1,188
Hydrocarbons	123	114	237

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*Based on 550 MW displacement from each system.

Table 4.2-11. Alternative 1 net emissions* by area (tons/year).

	Jacksonville	Sanford	FP&L (except Sanford)	Total
Sulfur dioxide	+ 6,752	-	-24,103	-17,351
Particulates	+ 225	-	- 1,335	- 1,110
Nitrogen oxides	+ 4,968	-	-10,917	- 5,949
Carbon monoxide	+12,100	-	+12,006	+24,106
Hydrocarbons	+ 513	-	+ 425	+ 938
Hydrochloric acid	+ 1,493	-	+ 1,548	+ 3,041

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*Net emissions equal the Alternative 1 emissions minus the oil displaced emissions.

**Distributed throughout the FP&L system

Table 4.2-12. Alternatives 2, 3, and 4 FP&L oil displaced emissions.

Pollutant	Sanford	FP&L (except Sanford)	FP&L (total)
Sulfur Dioxide	33,393[a]	10,449[f]	43,842
Particulates	386[b]	767[g]	1,153
Nitrogen Oxides	10,419[c]	5,458[c]	15,877
Carbon Monoxide	496[d]	260[d]	756
Hydrocarbons	99[e]	52[e]	151

[a] Based on Sanford SIP limit of 2.75 lbs SO_2/MMBtu (2.5% S).

[b] Based on SIP limit of 0.1 lbs MMBtu.

[c] Based on AP-42 estimate of 105 lbs/1000 gal (0.7113 lbs/MMBtu).

[d] Based on AP-42 estimate of 5 lbs/1000 gal (0.034 lbs/MMBtu).

[e] Based on AP-42 estimate of 1 lb/1000 gal (0.0068 lbs/MMBtu).

[f] Based on 1980 average Sanford oil sulfur content of 2.13%.

[g] Based on AP-42 estimate of 10(S) + 3 = 24.3 lbs/1000 gal uncontrolled emissions, and mechanical collectors at 84% efficiency, or 0.263 lbs/MMBtu.

Table 4.2-13. Alternatives 2, 3, and 4 oil displaced emissions for JEA, Sanford, and FP&L (tons/year).

	JEA	Sanford	FP&L (except Sanford)	FP&L	Total (JEA & FP&L)
Sulfur dioxide	27,922	33,393	10,449	43,842	71,764
Particulates	1,821	386	767	1,153	2,974
Nitrogen oxides	5,464	10,419	5,458	15,877	21,341
Carbon monoxide	617	496	260	756	1,373
Hydrocarbons	123	99	52	151	274

Table 4.2-14. Alternative 2 net emissions* by area (tons/year).

	Jacksonville	Sanford		FP&L (except Sanford)	Total	
		NSPS	SIP	(NSPS and SIP)	NSPS	SIP
Sulfur dioxide	-27,922	-21,340	+21,850	-10,449	-59,711	-16,521
Particulates	- 1,821	+ 217	+ 1,623	- 767	- 2,371	- 965
Nitrogen oxides	- 5,464	+ 1,634	+ 4,647	- 5,458	- 9,288	- 6,275
Carbon monoxide	- 617	+ 341	- 341	- 260	- 536	- 536
Hydrocarbons	- 123	+ 152	+ 152	- 52	- 23	- 23

*Net emissions equal the Alternative 2 emissions minus the oil displaced emissions.

Table 4.2-15. Alternative 3 net emissions* by area (tons/year).

	Jacksonville	Sanford		FP&L (except Sanford)	Total	
		NSPS	SIP	(NSPS and SIP)	NSPS	SIP
Sulfur dioxide	-20,634	-21,340	+21,850	-10,449	-52,423	- 9,233
Particulates	- 1,534	+ 217	+ 1,623	- 767	- 2,084	- 678
Nitrogen oxides	+ 290	+ 1,634	+ 4,647	- 5,458	- 3,534	- 521
Carbon monoxide	- 138	+ 341	+ 341	- 260	- 57	- 57
Hydrocarbons	- 118	+ 152	+ 152	- 52	- 18	- 18

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*Net emissions equal the Alternative 3 emissions minus the oil displaced emissions.

Table 4.2-16. Alternative 4 net emissions* by area (tons/year).

	Jacksonville		Sanford		FP&L (except Sanford)	Total	
	NSPS	SIP	NSPS	SIP	(NSPS and SIP)	NSPS	SIP
Sulfur dioxide	-23,340	-12,802	-21,340	+21,850	-10,449	-55,129	- 1,401
Particulates	- 1,592	- 1,057	+ 217	+ 1,623	- 767	- 2,142	- 201
Nitrogen oxides	- 882	+ 263	+ 1,634	+ 4,647	- 5,458	- 4,706	- 548
Carbon monoxide	- 298	- 298	+ 341	+ 341	- 260	- 217	- 217
Hydrocarbons	- 28	- 28	+ 152	+ 152	- 52	+ 72	+ 72

*Net emissions equal the Alternative 4 emissions minus the oil displaced emissions.

4.2.3 Comparison of Impacts

The alternative impacts are analyzed by comparing the net emissions for the alternatives. Table 4.2-17 presents a summary for the four area scenarios for all alternatives. Negative numbers in Table 4.2-17 indicate a net area decrease in air emissions for the alternative while positive numbers indicate a net increase in area emissions due to the alternative implementation. The preferred alternatives from an air quality standpoint can be determined from Table 4.2-17 by comparing the emissions by scenario and alternative by pollutant. The relative order of the alternatives by pollutant, based on the magnitude and direction of change of net emissions under each alternative, are presented in Appendix K.

4.2.4 Conclusions

The alternative impacts presented consider only emissions. While emissions are the primary concern for impact assessment, other factors such as meteorological conditions, operational characteristics, and the diversity of the emission sources (such as the FP&L system) can have an effect on ground level concentrations. For these reasons, the relative numbers projected in Table 4.2-17 should not be considered inflexible, but rather relative indicators of the actual impacts which would occur for any alternative implementation. The following discussion summarizes the relative impacts for each study area.

4.2.4.1 Jacksonville

Alternative 2 offers the greatest reduction in emissions for all pollutants in the Jacksonville area with all emissions of criteria pollutants decreasing. Emissions of all criteria pollutants will also decrease if Alternative 4 (NSPS) is implemented, although to a lesser extent than Alternative 2. All other alternatives will result in a net increase of at least one of the criteria pollutants and Alternative 1 will result in an increase in all of the criteria pollutants as well as hydrochloric acid.

4.2.4.2 Sanford

The Sanford area will experience a significant decrease in SO_2 emissions for Alternatives 2 (NSPS), 3 (NSPS), and 4 (NSPS). Emissions of SO_2 and all other criteria pollutants will either remain the same as the existing conditions or increase. The proposed project and Alternative 1 will result in no net change in the current levels of emissions in the Sanford area while Alternatives 2 (SIP), 3 (SIP), and 4 (SIP) will result in an increase in all criteria pollutant emissions.

4.2.4.3 FP&L Except Sanford

All alternatives except Alternative 1 will result in a net decrease in emissions in the FP&L system (except Sanford). The proposed project will result in the largest decrease and Alternatives 2, 3, and 4 will have equal decreases but somewhat less than the proposed project. Alternative 1 will result in decreases in SO_2, TSP, and NOx emissions and increases in CO and HC emissions.

Table 4.2-17. Net air emissions (tons/year) by area for the proposed project (SJRPP) and alternatives.*

	Jacksonville						Sanford							
	Proposed Project	Alternative 1	Alternative 2	Alternative 3	Alternative 4 NSPS	Alternative 4 SIP	Proposed Project	Alternative 1	Alternative 2 NSPS	Alternative 2 SIP	Alternative 3 NSPS	Alternative 3 SIP	Alternative 4 NSPS	Alternative 4 SIP
Sulfur Dioxide	+ 708	+ 6,752	-27,922	-20,634	-23,340	-12,802	-	-	-21,340	+21,850	-21,340	+21,850	-21,340	+21,850
Particulates	- 693	+ 225	- 1,821	- 1,534	- 1,592	- 1,057	-	-	+ 217	+ 1,623	+ 217	+ 1,623	+ 217	+ 1,623
Nitrogen Oxides	+17,139	+ 4,968	- 5,464	+ 290	- 882	+ 263	-	-	+ 1,634	+ 4,647	+ 1,634	+ 4,647	+ 1,634	+ 4,647
Carbon Monoxide	+ 1,216	+12,100	- 617	- 138	- 298	- 298	-	-	+ 341	+ 341	+ 341	+ 341	+ 341	+ 341
Hydrocarbons	- 105	+ 513	- 123	- 118	- 28	- 28	-	-	+ 152	+ 152	+ 152	+ 152	+ 152	+ 152
Hydrochloric Acid	-	1,493	-	-	-	-	-	-	-	-	-	-	-	-

	FP&L (Except Sanford)					Total							
	Proposed Project	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Proposed Project	Alternative 1	Alternative 2 NSPS	Alternative 2 SIP	Alternative 3 NSPS	Alternative 3 SIP	Alternative 4 NSPS	Alternative 4 SIP
Sulfur Dioxide	-25,001	-24,103	-10,449	-10,449	-10,449	-24,293	-17,351	-59,711	-16,521	-52,423	- 9,233	-55,129	-1,401
Particulates	- 1,686	- 1,335	- 767	- 767	- 767	- 2,379	- 1,110	- 2,371	- 965	- 2,084	- 678	- 2,142	- 201
Nitrogen Oxides	-11,994	-10,917	- 5,458	- 5,458	- 5,458	+ 5,145	- 5,949	- 9,288	- 6,275	- 3,534	- 521	- 4,706	- 548
Carbon Monoxide	- 571	+12,006	- 260	- 260	- 260	+ 645	+24,106	- 536	- 536	- 57	- 57	- 217	- 217
Hydrocarbons	- 114	+ 425	- 52	- 52	- 52	- 219	+ 938	- 23	- 23	- 18	- 18	+ 72	+ 72
Hydrochloric Acid	-	+ 1,548	-	-	-	-	+ 3,041	-	-	-	-	-	-

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*The No Action Alternative has no net increase or decrease in air emissions.

4.2.4.4 JEA and FP&L Total

Alternative 2 (NSPS) will result in the greatest decrease in all emissions when both the JEA and FP&L systems are considered. Alternatives 2 and 3 (both NSPS and SIP) will result in a decrease in emissions of all criteria pollutants. Alternative 4 will cause a net decrease in all pollutants except hydrocarbons. The proposed project will cause an increase in NOx and CO emissions while Alternative 1 will cause an increase in CO, HC, and HCl.

4.3 SURFACE WATER RESOURCES

The potential impacts of the proposed project (SJRPP), the No Action Alternative, and the four additional alternatives on surface water resources are summarized in this section. For further information refer to Appendix L.

4.3.1 Construction-Related Impacts

This section summarizes the potential construction-related impacts that could result from the proposed project (SJRPP) and the four alternatives. The potential effects of surface runoff, wastewater, and dredging activities during construction on surface water resources are described. No change from existing conditions is expected under the No Action Alternative and therefore no further discussion of this alternative is provided.

4.3.1.1 Proposed Project (SJRPP)

SJRPP Plant Site

Approximately 300 acres of land within the railroad loop will be cleared and grubbed. Approximately 10 acres within this area will be paved (construction, buildings, roads, etc.). The total site runoff is expected to be about 61 acre-feet, based on the 10-year, 24-hour design storm of 7.6 inches.

During construction, temporary sedimentation ponds will be located southeast of the railroad loop and within the area enclosed by the loop. All runoff waters generated within the general boundaries of the rail loop during construction will be directed to these ponds. Effluent from the ponds will be directed to the main construction sediment control pond where the effluent will be discharged (NPDES 002) to a borrow pit connected to Browns Creek. This runoff is expected to contain little chemical contamination, but will contain suspended solids from soil erosion as well as BOD and nutrients from runoff and the sanitary wastewater treatment facility. JEA has projected the total suspended solids concentration in the pond effluent to be 50 mg/l on an average daily basis with a maximum of 100 mg/l. However, because Browns Creek is a small, tidally flushed stream with high biological sensitivity, a higher degree of sediment control would be necessary to prevent degradation of water quality and impacts of increased sedimentation on benthic invertebrates. The runoff sediment control pond will be designed with sloping embankments, thus allowing growth of vegetation along the edges of the pond and facilitating biological uptake of nutrients and metals which may be contained in runoff entering the pond (JEA/FP&L 1981b).

SJRPP - Sanitary Wastes

During plant construction, the peak manpower is expected to be approximately 2,300 people. Of this number, approximately 650 people are expected to use portable, self-contained toilet facilities. Wastes from the portable facilities will be disposed of off-site by licensed contractors. The remainder of the work force is expected to use temporary and permanent toilet facilities. Wastewater from these facilities will be treated in two 15,000 gpd extended aeration type package plants. These plants are designed to achieve 90% to 95% removal of BOD_5 and suspended solids while minimizing biological sludge production. Effluent quality from the plant(s) is expected to be as follows (JEA/FP&L 1981b):

Total Suspended Solids	20 mg/l
BOD_5	20 mg/l
Oil and Grease	10 mg/l
Nitrogen as N	40 mg/l
Phosphorus as P	10 mg/l

During construction, the effluent from the sanitary waste treatment facility will be directed to the runoff sediment control pond where it will be discharged with the runoff to Browns Creek (NPDES 002). The effluent from the sanitary wastewater treatment facility would be highly diluted in the sediment pond and would constitute only a small portion (6%) of the total discharge on an annual average. However, during dry weather sanitary effluent could constitute a greater portion of the total discharge and the concentration of total residual chlorine (TRC) would be of concern. Measures should be taken to minimize the concentration of TRC in the effluent to avoid toxic effects on sensitive aquatic species in Browns Creek marsh. An effluent limitation of 0.01 mg/l with no mixing zone has been recommended in the Draft NPDES Permit (Appendix B). After Unit 1 is completed the sanitary effluent will be rerouted to the NGS discharge channel. After construction is completed only one of the two plants will be needed for the 375 operational employees and the other will be retained as a stand-by unit.

SJRPP - Other Wastewaters

Approximately 20,000 gpd of wastewater are expected to be generated from truck washing. Washout from trucks will be directed to a 2.2 million gallon capacity sedimentation pond and then to the construction phase runoff sediment control pond. Rainfall runoff from the equipment refueling areas will be directed to the runoff sedimentation pond through oil-water separators designed to handle the 10-year, 24-hour storm.

Pre-operational boiler and condensate system cleaning wastes will be treated on-site after neutralization in the metal cleaning waste retention basin. The waste cleaning solutions, flush waters, and associated debris will be piped to the retention basin for the neutralization and precipitation of iron oxides. The supernatant will then be treated in the wastewater treatment facility for solids removal and final pH adjustment. It is anticipated that the effluent will be discharged to the St. Johns River via the NGS discharge channel, although the alternative of having a contractor dispose of the waste will also be considered (JEA/FP&L 1981b).

Blount Island Coal Unloading Facility - Area Runoff

During construction, some suspended solids in non-point source runoff will enter Fulton-Dame Point Cutoff. These materials will create localized problems with turbidity, but will not adversely affect the water quality of the Fulton-Dame Point Cutoff.

Blount Island Coal Unloading Facility - Dredging

Dredging will be performed in order to construct the dock for the coal unloading facility. The dredging operation will result in an increase in turbidity and in the levels of suspended solids in the water column.

Elutriate tests on the sediments of the Fulton-Dame Point Cutoff at the site of the proposed coal unloading facility showed that levels of the following pollutants were in excess of State water quality criteria for Class III marine waters. (Mercury may not in fact exceed the Class II standard of 0.0001 mg/l because the method of detection used in the elutriate test was defined as being 0.0002 mg/l, which makes it appear that a violation would occur):

- Antimony
- Cadmium
- Copper
- Lead
- Mercury
- Oil and Grease
- Silver

The JEA has applied to FDER for a variance from State water quality standards outside of the maximum allowable mixing zone during dredging for aluminum, cadmium, copper, cyanide, iron, lead, mercury and silver (JEA/FP&L 1981d). Dredging may release varying amounts of these toxic materials and could be detrimental to aquatic organisms. Any materials released, however, would be rapidly removed from the water column by settling. No long-term changes in the water quality of the St. Johns River are expected to occur as a result of dredging. All dredged material will be disposed of in diked and weired upland areas. No long-term changes in water quality from weir discharges are expected.

Transmission Lines

The construction of two 230 kV transmission lines from the proposed site to the Normandy Substation and the Fort Caroline and Robinwood Substations would have short-term impacts on water quality. Tower construction in the Mill Cove mud flat areas east of the existing line would require draglining or dredging to accommodate equipment use. A temporary increase in turbidity would occur and as in the case of the Blount Island coal facility construction, there would be some resuspension of pollutants in the sediment. Turbidity screens would be used to minimize water quality degradation. Dredging equipment would be brought into the area by barge via the existing channel (JEA/FP&L 1981a).

Approximately 120 acres of land would have to be cleared in order to accommodate the new transmission line. Six or more streams and channels would be spanned by the transmission lines not including the crossing of the St. Johns River. Culverts would be placed where necessary to avoid altering streamflow characteristics during construction activities. Erosion of soil during construction of the transmission lines would increase sedimentation and degrade water quality at stream crossings. The use of construction equipment compacts topsoil and as a result, infiltration of rainfall is reduced and surface runoff and erosion increase. Increased erosion is evidenced by rills and gullies. The loss of topsoil and soil compaction removes nutrients and causes decreased soil productivity (JEA FP&L 1981a). However, construction activities will occur on a relatively small portion of the transmission corridor at any one time. Because the terrain is flat and the new ROW will follow the existing ROW over most of its length, erosion and sedimentation from the proposed project should be minor.

4.3.1.2 Construction-Related Impacts of the Alternatives

This section summarizes the potential impacts to surface waters under Alternatives 1 through 4. The potential effects of construction-related wastewater discharges, increased erosion and dredging are considered.

Alternative 1

The construction of the five refuse-fired power plants will generate wastewater and area runoff with characteristics similar to those described for the proposed project. Because these facilities will be smaller than the SJRPP, the amount of wastewater generated will be less than for the construction of SJRPP.

Wastewater generated by the conversion of NGS Units 1 and 3 to a coal-oil mixture will be processed in the plant's existing wastewater treatment plant and discharged through percolation ponds. A slight increase in the mass of pollutants entering near surface groundwaters will occur. Construction of 150 miles of transmission lines will require the removal of vegetation and the denudation of soil. Increased soil erosion will occur along with increased storm water runoff. Streams will experience increased sedimentation and increased water temperatures, and some modifications to streambanks may occur at the point where transmission lines cross the streams.

Alternative 2

Conversion of FP&L's Sanford Units 4 and 5 will require clearing of vegetation; construction of temporary facilities including access roads, shops, and storage sheds; and earthwork including excavation, grading, trenching, and soil treatment. Most of these activities are associated with the construction of the coal storage area and, in the case of NSPS, the FGD sludge landfill.

These activities will increase soil erosion and storm water runoff. Suspended sediments discharged to the St. Johns River at Sanford will contain some heavy metals as well as oil and grease. Local increases in turbidity near the point of discharge will occur, but lasting degradation of water quality is not expected. Construction of 150 miles of transmission line will result in increased soil erosion and sedimentation at the point where transmission lines cross streams. These effects will be of short duration, however.

Alternative 3

The construction impacts associated with the conversion to coal of FP&L's Sanford Units 4 and 5 are discussed under Alternative 2. Construction of a 280 MW coal-fired plant at the site of the proposed project would result in the same types of impacts as would the proposed project. The magnitude of the effects on surface water quality would be less because of the smaller area involved. No dredging would occur in the Fulton-Dame Point Cutoff, eliminating any dredging-related water quality degradation. No construction activities would occur on Blount Island since a coal unloading facility would not be required under this alternative.

Alternative 4

Under this alternative, the only construction-related impacts on the surface water resource would be in association with the conversion to coal of FP&L's Sanford Units 4 and 5 and the coal conversion of NGS Unit 3. Construction-related water quality impacts of this alternative would be similar to those described for the Sanford Units under Alternative 2, except that in the case of the NGS Unit 3 conversion the sedimentation and runoff of oil and grease would occur in or adjacent to a much more senitive estuarine system.

4.3.2 Operation-Related Impacts

4.3.2.1 No Action

Under the No Action Alternative, no power plant would be built at the proposed project site and no other action would be taken to bring power to FP&L's or JEA's system. The other facilities of concern, JEA's NGS and FP&L's Sanford Plant, would continue to operate as they do now. At the NGS, once-through cooling water would continue to be withdrawn and discharged to the St. Johns River. Wastewaters would continue to be discharged to percolation ponds where they seep into the near surface water table. At the Sanford Plant, cooling would continue by means of the closed cycle cooling lake. Surface water quality in the St. Johns River would remain unchanged from existing conditions. In the Blount Island Channel and the Fulton-Dame Point Cutoff, ambient concentrations of the pollutants identified in Section 3.2.1 would continue at times to exceed the State water quality criteria for Class III marine waters.

4.3.2.2 Proposed Project (SJRPP)

The two primary sources of water for the SJRPP plant will be surface water from the St. Johns River and groundwater from the Floridan Aquifer. The discharges from cooling tower blowdown and the wastewater treatment system will be through the NGS discharge canal to the St. Johns River. Primary concerns with respect to surface water quality are discharges of residual chlorine, heat, copper, iron, mercury, cyanide, silver, oil and grease, and aluminum.

SJRPP - Cooling Tower Blowdown

The dilution flow from the existing NGS is a main factor in determining the impact of the thermal discharge from the SJRPP. The discharge from the proposed plant will be mixed with the NGS discharge water and diluted before being discharged to the St. Johns River. Mathematical modeling was performed to predict the average and extreme characteristics of the thermal plumes in the St. Johns River. Under average conditions, the extent of the plume from the combined discharge is predicted to be greater than that for the NGS alone by 60 to 630 feet in length and 0.4 to 2.8 acres in area, with respect to the 2° F isotherm (JEA/FP&L 1981a). The extent of the thermal plume would increase over baseline conditions during all months of the year. The modeling performed for the SJRPP discharge was based on the assumptions that the SJRPP discharged into the NGS surface water intake, flowed through the once-through cooling system, and discharged to the St. Johns River. The revised wastewater discharge plan calls for the SJRPP to discharge directly to the NGS discharge canal. This design change will not alter the conclusions derived from the modeling. The proposed plan is expected to be in compliance with present regulatory requirements for thermal discharges from the NGS point of discharge (POD) to the St. Johns River and the same mixing zone should be recognized for the SJRPP plant as for the NGS.

The concentration of chemical and physical constituents in the cooling tower blowdown from SJRPP will be directly proportional to those in the makeup water. Individual chemical and physical characteristics of the blowdown were calculated by multiplying the corresponding parameter in the makeup water by the 1.5 or less cycles of concentration estimated for the cooling towers. The only chemical additions to the towers will be chlorine to control biological fouling and sulfuric acid to control scaling (JEA/FP&L 1981b). In accordance with the Standards of Performance for New Source steam electric generating stations (Table 4.3-1), concentrations of free available chlorine in the blowdown will not exceed 0.2 mg/l for more than two hours per day per cooling tower prior to combination with other plant effluents. A chlorine minimization study will be implemented soon after plant start-up to establish appropriate doses of chlorine. Sulfuric acid additions are expected to be on the order of 25 to 50 mg/l of feed water. An increase in sulfate concentrations in the cooling tower blowdown is expected as a result of these additions (JEA/FP&L 1981b).

It is proposed that the cooling tower blowdown be discharged directly to the existing NGS discharge channel without being treated (JEA/FP&L 1981a). Predicted cooling tower blowdown concentrations for the pollutants of concern are presented in Table 4.3-2 along with predicted in-stream concentrations. Concentrations of copper, cyanide, iron, mercury, and silver would exceed State water quality criteria for Class III marine waters (JEA/FP&L 1981c). The high levels of these pollutants are due to the high concentrations observed in the St. Johns River coupled with the concentrating effects of the cooling towers. Residual chlorine may also be discharged at levels which exceed water quality criteria, but such discharges can occur at most for two hours daily for each of the towers.

Because levels of total residual chlorine (TRC) in excess of State water quality standards have been observed in the St. Johns River (JEA/FP&L 1981c), there is concern over the impacts of free available oxidants (FAO) and total

Table 4.3-1. U.S. Environmental Protection Agency standards of performance of new sources: maximum allowable discharge concentrations by waste source (milligrams per liter)[a].

Waste source	Effluent Characteristics													
	Total suspended solids		Oil & grease		Allow. pH range[e]	PCB	Copper, total		Iron, total		Free available chlorine[b]		Zinc, chromium, phosphorus, and other corrosion inhibitors		Heat
	Daily max.[c]	Daily avg.[d]	Daily max.	Daily avg.			Daily max.	Daily avg.	Daily max.	Daily avg.	Max. instantaneous	Chlorination period avg.	Daily max.	Daily avg.	
All discharges					6.0-9.0	ND									
Low-volume wastes[f,g]	100	30	20	15											
Bottom-ash-transport water[f,h]	100	30	20	15											
Fly-ash-transport water[f,i]	ND[j]	ND[j]	ND[j]	ND[j]											
Metal-cleaning wastes and boiler blowdown[f,g]	100	30	20	15			1	1	1	1					
Cooling-tower blowdown[f,k]											0.5	0.2	NDA[l]	NDA[l]	
Main condenser															ND[j,m]
Coal-pile runoff[n]		50[o]			6.0-9.0										
Construction runoff[n]		50[j,o]			6.0-9.0										

Abbreviations:
PCB = polychlorinated biphenyl compounds.
ND = no discharge.
NDA = no detectable amount.

Note: See footnotes at end of table.

Table 4.3-1. U.S. Environmental Protection Agency standards of performance of new sources: maximum allowable discharge concentrations by waste source (milligrams per liter)[a] (concluded).

[a] From Federal Register, Volume 39, No. 196, October 8, 1974 (Code of Federal Regulations, Title 40, Part 423 (Promulgated)) and Federal Register, Volume 45, No. 200, October 14, 1980 (Code of Federal Regulations, Title 40, Part 423 (Proposed)).

[b] Neither free available chlorine nor total residual chlorine may be discharged from any unit for more than 2 hours in any one day, and not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate to the Regional Administrator that the units in a particular location cannot operate at or below this level of chlorination. (Note: The instantaneous maximum concentration of 0.14 milligram per liter of total residual chlorine (total residual oxidants) is included in the October 14, 1980, proposal.)

[c] Maximum 24-hour value.

[d] Average value for 30 consecutive days.

[e] Measured in standard units.

[f] The quantity of pollutants discharged shall not exceed the quantity determined by multiplying the flow from the waste source by the concentration in the table.

[g] Include, but are not limited to, wastewaters from wet-scrubber air-pollution-control systems, ion-exchange water-treatment systems, water-treatment-evaporator blowdown, laboratory and sampling streams, floor drainage, cooling-tower-basin-cleaning wastes, and blowdown from house-service recirculating-water systems. Boiler blowdown is included in the October 14, 1980, proposal.

[h] The quantity of pollutants discharged shall not exceed the quantity determined by multiplying the flow of bottom-ash-transport water by the above concentrations and dividing the product by 20. The elimination of this requirement is included in the October 14, 1980, proposal.

[i] The dry-fly-ash-handling requirement (i.e., no discharge of copper, nickel, zinc, arsenic, and selenium) is included in the October 14, 1980, proposal .

[j] Limitations remanded and set aside by the United States Court of Appeals for the Fourth Circuit on July 16, 1976.

[k] Blowdown shall mean the minimum discharge of recirculating cooling water for the purpose of discharging materials contained in the process, the further buildup of which would cause concentrations exceeding limits established by the best engineering practice.

[l] No discharge of cooling-tower-maintenance chemicals that contain the 129 priority pollutants is included in the October 14, 1980, proposal.

[m] There shall be no discharge of heat from the main condensers except for heat that may be discharged in blowdown from cooling-water-recirculation systems, provided that the temperature at which the blowdown is discharged does not exceed at any time the lowest temperature of recirculated cooling water before the addition of the makeup water.

[n] Any untreated overflow from facilities constructed and operated to treat the volume of material-storage runoff and construction runoff that results from a 10-year, 24-hour rainfall event shall not be subject to the pH and total-suspended-solids limitations stipulated for this waste source.

[o] Instantaneous maximum limits, not daily averages.

Note: In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

Table 4.3-2. Chemical characteristics of the SJRPP effluent for parameters of concern (JEA/FP&L 1981c).

Parameter (units)	Aluminum (mg/l)	Copper (mg/l)	Cyanide (ug/l)	Iron (mg/l)	Mercury (ug/l)	Oil and Grease (mg/l)	Silver (ug/l)	Total Residual Chlorine (mg/l)
Predicted Pump Sump Concentration	0.14	1.0	0	1.0	37.4	15	5.8	0
Cooling Tower Blowdown Concentration (av./max.)	0.7/5.4	0.1/0.41	14/134	1.2/4.0	0.35/0.89	2.9/13.4	0.23/0.52	NA[a]
Discharge to River Concentration[b] (av./max.)	0.5/4	0.072/0.34	10/99	0.83/3	0.56/1.67	2.06/10.4	0.21/0.54	NA[a]
Mixing Zone Concentration[c] (av./max.)	d/3.66	0.071/0.283	d/91	d/2.73	0.27/0.7	d/9.1	0.165/0.37	NA[a]
Observed Ambient Concentration (av./max.)	0.49/3.63	0.069/0.275	10/90	0.8/2.7	0.24/0.6	2/9	0.16/0.35	0.03/0.2
Water Quality Criterion (not to exceed)	1.5	0.015	5	0.3	0.1	5	0.05	0.01
Observed Ambient % Occurrence Above Criterion	14.3	99.4	36.8	97.7	36	4.6	1.5	1.6

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[a] Not available, will be below EPA standard (0.2 mg/l average, 0.5 mg/l maximum free available chlorine)
[b] Point of discharge to St. Johns River through existing NGS submerged diffuser
[c] Values are predicted at the boundary of a 31 acre mixing zone
[d] Value less than, or essentially equal to, observed average ambient concentration

residual oxidants (TRO) (chlorine plus other oxidants formed by the reaction of chlorine with other materials in salt water) on the water quality of the River. In addition, the interaction of chlorine discharges from NGS Units 1, 2, and 3 and SJRPP Units 1 and 2 has not been established. The Draft NPDES Permit will recommend that the concentration of TRO be limited to 0.2 mg/l in the blowdown, 0.1 mg/l at the POD, and 0.01 mg/l at the edge of the mixing zone in Blount Island Channel. Other than the chlorine minimization study no information has been presented to indicate how JEA intends to comply with these limitations. The use of dechlorination, blowdown holdup and use of an automatic, mechanical condenser biofouling control system may be considered.

SJRPP - Other Plant Effluent Streams

Wastewaters from SJRPP Units 1 and 2 will originate from a number of sources other than the cooling towers. These include area runoff, coal handling, ash handling, metal cleaning, FGD blowdown, sanitary wastes, boiler blowdown, and miscellaneous low volume wastes. Effluents from particular operations will be reused where feasible, and when necessary they will be treated prior to reuse. Effluents not suitable for reuse will be collected in lined retention basins or sediment ponds and treated at the chemical wastewater treatment facility as required to meet the Standards of Performance. The chemical wastewater treatment facility (Section 2.2.7.2) will be capable of providing treatment for metal cleaning wastes, area runoff, and small volume process wastewaters. In addition, facilities will be provided for sanitary wastewater treatment and removal of oil and grease. Chemical characteristics of the effluent from the SJRPP wastewater treatment system are difficult to predict since the coal and coal waste characteristics have not been identified. The final effluent quality will depend on the type of coal used, intensity and duration of rainfall, and operating characteristics of the treatment process. Nevertheless, effluent concentrations have been estimated on conservative values reported in the literature for waste streams resulting from similar plant operations and average treatment levels achieved by similar processes. These are presented as the combined concentration of all wastewater effluents at the pump sump (Table 4.3-2).

The cooling tower blowdown and all normal operational wastewater treatment system effluents will be combined as NPDES discharge #001 (JEA/FP&L 1981e) and discharged to the St. Johns River through the NGS discharge channel. At the point of discharge to the St. Johns River, maximum and average concentrations are projected by the applicant to exceed Class III water quality criteria for the following pollutants (JEA/FP&L 1981b):

- Copper
- Cyanide
- Iron
- Mercury
- Silver
- Aluminum (maximum only)
- Oil and grease (maximum only).
- Total residual chlorine (TRC)

Because the standards for these pollutants would be perodically exceeded even under existing conditions, JEA has petitioned FDER for a variance from State water quality criteria in the mixing zone of the Blount Island Channel (JEA/FP&L 1981c).

In the event that a storm in excess of the 10-year, 24-hour magnitude occurs such that runoff exceeds the capacity of the treatment system, the excess will be discharged from the runoff sedimentation pond to Browns Creek. This discharge point is near the discharge 002 (Construction Runoff Sediment Control Pond Effluent) listed in the Draft NPDES permit.

SJRPP - Landfill Leachate

Solid wastes produced by the plant operation will include those generated by the flue gas desulfurization (FGD) system (FGD sludge) and by the coal combustion system (fly ash and bottom ash). Other solid wastes include relatively small volumes of sludges from the sedimentation ponds, retention basin, cooling towers, and wastewater treatment facilities. Metal cleaning waste sludges may be classified as hazardous depending on actual chemical characteristics. Attempts will be made to market FGD sludge, fly ash, and bottom ash, but if these attempts fail these wastes together with the other solid wastes will be placed in the on-site landfill.

The landfill would be developed so that the base will be above the seasonal high water table and so that the base material will have a permeability of 9×10^{-4} cm/sec (JEA/FP&L 1981b). Rainfall infiltration will be reduced to between 5 and 8 inches per year following closure of a typical 10-acre disposal cell. This will result in the production of approximately 500 gallons per day of leachate. While a cell is being actively filled, infiltration rates and leachate production will be higher. The movement of groundwater in the water table aquifer at the SJRPP site is downgradient towards Browns Creek and Clapboard Creek. Due to the high permeability and low cation exchange capacity of the sandy soils on the SJRPP site, there is a potential for leachate that enters the water table aquifer to move downgradient towards the creeks and adversely impact surface water quality.

Groundwater quality downgradient from a solid waste disposal area will be dependent on the quality of the actual leachate. Table 4.3-3 presents the median and maximum values of leachate constituents as reported in the literature (JEA/FP&L 1981a). If solid waste leachate at the site contains concentrations of constituents approaching the upper ends of ranges of reported values, resultant groundwater quality may exceed State water quality standards (JEA/FP&L 1981a). Estimated mass loadings of individual pollutants on Browns Creek, which lies downgradient from the landfill cells, include approximately 2 to 5 pounds of arsenic, selenium, and zinc per year per acre of landfill. Lesser amounts of copper, lead, mercury, nickel, silver, and antimony will also leach into Browns Creek (Table 4.3-3). If 100 acres of the 551 acre landfill contribute leachate to Browns Creek, then loadings of heavy metals on Browns Creek would be 100 to 500 pounds per year. These estimates are based solely on assumed leachate characteristics of typical FGD sludge. The loadings do not account for the leachate characteristics of unmarketed bottom ash and fly ash and the low volume solid wastes which may be codisposed of on-site. These factors plus the potential sale of some high volume solid waste could change the leachate characteristics from the site and the subsequent loadings to surface waters.

Table 4.3-3. Assumed chemical characteristics of FGD blowdown raw wastewater and FGD sludge leachate (JEA/FP&L 1981a; JEA/FP&L 1981b).

Parameter	Raw Waste Concentration FGD Blowdown (mg/l)	Solid Waste Leachate FGD Sludge Liquors (mg/l) Median	Maximum	Mass Loading[1] on Browns Creek (lbs/acre)
Arsenic	0.300	0.020	1.80	2.73
Cadmium	0.110	0.023	0.10	0.15
Calcium	3,000	700	2,600	3,950
Chromium	---	0.02	0.50	0.76
Copper	0.200	0.015	0.40	0.61
Iron	8.1	0.026	0.10	0.15
Lead	0.40	0.12	0.55	0.83
Mercury	0.070	0.001	0.07	0.11
Nickel	1.500	---	---	---
Selenium	2.200	0.110	2.70	4.10
Silver	0.600	---	---	
Zinc	0.350	0.046	27.00	10.62
Aluminum	0.300	---	---	---
Antimony	2.300	---	---	---
Beryllium	0.140	---	---	---
Boron	0.046	---	---	---
Manganese	2.500	0.17	9.00	13.66
Chlorides	6,905	2,300	5,000	7,588
Sulfate	10,000	2,100	30,000	45,530

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[1] Estimated by WAPORA based on ilfiltration rate after cell closure and maximum leachate concentrations.

Blount Island Coal Unloading Facility

Wastewater generated at the Blount Island coal unloading facility will consist of sanitary wastes, area drainage, and rainfall runoff. Sanitary wastes will be pumped to the existing Jacksonville Port Authority sanitary waste facility. Treatment will be provided for runoff volumes up to the 10-year, 24-hour rainfall event (JEA/FP&L 1981b).

Site drainage is expected to average 5 gallons per minute (gpm) with a maximum of 50 gpm. Rainfall runoff from the lined coal piles on Blount Island will average 100 gpm based on an area of 35 acres, an average rainfall of 54.5 inches, and a runoff coefficient of 1.0. The rainfall runoff and site drainage will be directed to a lined sediment pond located at the Blount Island unloading site where it will be treated for pH adjustment, iron precipitation, and suspended solids removal. After treatment, the effluent from the sedimentation pond will be discharged to the percolation pond. No application for an NPDES Permit for an emergency discharge has been filed so it is assumed that no discharge to surface waters from this facility will occur under any circumstances.

Groundwater quality will be degraded by the water which infiltrates through the bottom and sides of the percolation pond. The quality of the leachate will be related to the kind and quantity of soluble minerals in the coal. The runoff collected in the percolation pond will enter the existing near-surface soils on the Island and will migrate to the Fulton-Dame Point Cutoff.

Since a specific project coal source has not been selected, published coal pile runoff quality data for Appalachian coal (USEPA 1978) were used to calculate loadings on the wastewater treatment system, the percolation pond, and the St. Johns River (Table 4.3-4).

Table 4.3-4. Coal pile runoff quality and estimated loadings on the wastewater treatment system, on the percolation pond, and on the St. Johns River (USEPA 1978).

		Loadings (lbs/yr)		
Parameter	Runoff Concentration (mg/l)	Wastewater Treatment System	Percolation Pond[1]	St. Johns River[2]
Arsenic	23.0	2,996.2	599.2	539.3
Copper	0.02	2.68	0.54	0.48
Iron	3.1	405.2	81.0	72.9
Lead	0.05	6.50	1.30	1.17
Mercury	0.0005	0.065	0.013	0.012
Nickel	0.06	7.82	1.56	1.41
Selenium	23.8	3,100.4	2,480.3	2,232.3
Zinc	0.8	104.3	20.9	18.8

[1] Assumes 80% removal of pollutants in treatment system except for selenium which is assumed to be removed only to a level of 20%

[2] Assumes 90% of pollutants delivered to the groundwater from the percolation pond reaches the St. Johns River.

Pollutants seeping into the St. Johns River from the Blount Island coal unloading facility would contribute to periodic violations of Class III water quality standards for copper, iron and mercury. For these parameters, no degree of mixing would achieve compliance with the standards. Normally, however, the leachates would be diluted rapidly to the ambient river concentrations in the Fulton-Dame Point Cutoff. Loadings of selenium, zinc, and arsenic may degrade the River in the vicinity of the unloading facility.

4.3.2.3 Operation-Related Impacts of the Alternatives

This section summarizes the potential impacts to surface waters during the operation phase of Alternatives 1 through 4. As indicated in Section 2.6, the implementation of these alternatives would displace oil-fired generation of electrical power in both the JEA and FP&L systems. The displacement of generation also displaces the consumption of water and generation of pollutants by those facilities. Because this displacement would occur throughout the respective systems, it cannot be ascribed to one particular site. However, it may be associated with an area. For comparison purposes, the net effect of each alternative including the proposed project on the generation of wastewater pollutants of concern has been identified for the major areas impacted by the alternatives (Section 4.3.2.4, Table 4.3-5), the Jacksonville area, the Sanford area, and other dispersed portions of the FP&L service area. The total net effect of each alternative for Florida as a whole is also shown.

Alternative 1

The five refuse plants would use surface water for cooling and at four of the sites it is assumed that surface water would also be used as makeup to the other plant operations. Discharges from the wastewater treatment systems of the five plants are assumed to be at approximately the same concentrations as those predicted for SJRPP. Cooling tower blowdown quality is assumed to be approximately the same as that for SJRPP for the pollutants of concern. Because the refuse plants would generate only 114.5 MW compared with SJRPP's 1,100 MW, annual wastewater discharge volumes, heat discharges, and pollutant loadings to receiving surface waters would be proportionally lower than at SJRPP (see Table 2.6-3).

Conversion of the NGS Units 1 and 3 from oil to a coal-oil mixture (COM) would result in a loss of 79 MW in the generating capacity at NGS. Consequently, a decrease from existing conditions in the heat discharge and total residual chlorine discharge would occur. With COM, a bottom ash blowdown would be required to prevent the buildup of solids. Because the blowdown would be treated and discharged to the St. Johns River, additional loadings of the pollutants of concern on the River would be realized. Because the NGS is derated, other operation wastewaters would decrease in volume (Appendix CC). However, these wastewaters would continue to be discharged to the environment by way of the existing NGS percolation ponds. The quantity of water which seeps to the surface waters via the near surface groundwater system would decrease if COM conversion occurred at NGS. The change in water quality in the St. Johns River and in local tributaries as a result of the decrease in percolation would be imperceptible.

No direct impacts on surface water resources are expected as the result of the installation of residential solar water heaters.

Alternative 2

In converting FP&L's Sanford Units 4 and 5 from oil to coal, increases in discharges to surface waters would occur from bottom ash handling and metal cleaning operations and coal pile runoff (see Table 2.6-5). An increase in discharges from sanitary facilities and decreases in discharges from demineralizers and boiler blowdown would also occur, but these changes would not be great. The cooling system for Sanford Units 4 and 5 is an artificial cooling lake with no discharge to the St. Johns River except during emergency conditions. To date no discharges from the pond to the River have been observed.

Under the SIP option 90.2 acres of land would be required for disposal of bottom ash and fly ash. For the NSPS option 194.6 acres of land would be required for disposal of bottom ash, fly ash, and FGD sludge. It is assumed that any landfill areas on the site would be lined with an impermeable liner. Therefore, no impacts on surface water resources due to leachate would be expected.

Operation and maintenance of an additional 150 miles of transmission lines would have only a minimal effect on surface water resources due to the runoff of sediment from maintenance roads at stream or lake crossings during storm events. Water consumption and pollutant generation would also be displaced at oil-fired plants throughout the JEA and FP&L systems. The net effect of Alternative 2 on pollutant generation in the JEA and FP&L systems is shown in Table 4.3-5.

Alternative 3

The surface water impacts of the conversion of FP&L's Sanford Units 4 and 5 to coal are discussed under Alternative 2. Power purchased from Georgia Power Company's Vogtle Power Plant would be transmitted over existing transmission lines; therefore, no water quality impacts would be observed. However, water consumption and pollutant generation would be reduced at power plants in the JEA and FP&L systems where oil-fired power was being displaced.

Construction of a 280 MW coal-fired power plant at the same site as the proposed project would result in discharges from cooling tower blowdown and from the several plant operations which would be discharged through wastewater treatment facilities similar to those proposed for the SJRPP but of reduced size. Discharges would be reduced from the proposed SJRPP discharges in proportion to the reduction in generating capacity between the 280 MW power plant and the net 1,100 MW SJRPP (see Table 2.6-7). Pollutant loadings to the St. Johns River would be similarly reduced. Because the discharge would still be to the River by way of the NGS discharge channel, no change from the NGS-permitted mixing zone would be required. The average concentration of pollutants of concern in the discharge would be above the standards for Class III waters and the maximum concentrations would exceed the ambient concentrations of these pollutants in the St. Johns River as well. Because ambient concentrations in the River already exceed Class III standards, the discharge would be expected to further degrade the water quality of Blount Island Channel but to a lesser extent than SJRPP. It is assumed that all solid waste landfill areas would be lined with an impermeable material so that no impacts on surface water due to leachate are anticipated. The net effect of Alternative 3 on pollutant generation in the JEA and FP&L service areas is indicated in Table 4.3-5.

Alternative 4

The surface water impacts of the conversion of FP&L's Sanford Units 4 and 5 to coal would be the same as those discussed under Alternative 2. No additional transmission lines would be required for this alternative and no additional right-of-way runoff effects would be expected. Also, water consumption and pollutant discharges would be reduced at power plants in both systems at which oil-fired generation is being displaced.

Converting JEA's NGS Unit 3 to coal would result in a loss in electrical generating capacity of 247 MW. The derating of the plant would result in a decrease in cooling water requirements and a decrease in wastewater generated from demineralizers and boiler blowdown (see Table 2.6-9 and Appendix CC). Additional wastewaters would be produced from coal pile runoff, metal cleaning, and ash handling. If NSPS are imposed, additional wastewater would also be produced by the FGD system. No leachate from the solid waste landfill would seep into Browns Creek because all of these areas would be lined with an impermeable material.

The decreased cooling water requirements due to derating would result in a decrease in the discharges to the St. Johns River of heat and residual chlorine. Also, wastewaters from the demineralizers would decrease by 20% while metal cleaning wastewaters would increase slightly. Boiler blowdown volume would be reduced by 20% and would be recycled for bottom ash handling before being discharged to the percolation pond. The overall reduction in flow to the percolation ponds would result in a decreased seepage of pollutants to the surface waters. The actual decrease in pollutant flux cannot be quantified.

Under the NGS coal conversion option, increased pollutant loadings would enter the St. Johns River from FGD wastewaters and coal pile runoff. Both of these sources of wastewater are assumed to discharge to the St. Johns River after being treated. These discharges would degrade the waters of the St. Johns River from the existing conditions. The net effect of Alternative 4 including oil displaced discharges on wastewater pollutant generation in the JEA and FP&L service areas is indicated on Table 4.3-5.

4.3.2.4 Comparison of Impacts

In order to compare the relative impacts of the various alternatives and the proposed project, a pollutant generation analysis was performed. It was assumed that the additional generating capacity provided by power purchases and modified or new power systems would reduce the operation time of oil-fired plants in the JEA and FP&L systems. In the JEA and FP&L systems all oil-fired plants are assumed to use once-through cooling water systems and to discharge wastewaters to percolation ponds as at NGS. Reduced operations would decrease wastewater discharges to the percolation ponds and reduce the discharge of heat and chlorine through the once-through cooling water. The pollutant loads delivered to the surface waters by seepage from the percolation ponds are not quantified in the analysis of pollutant loadings on surface waters in Jacksonville, Sanford, and the FP&L system outside Sanford.

The proposed project and the small 280 MW coal-fired plant were assumed to discharge all treated wastes and cooling tower blowdown to the St. Johns River. Under the conversion of the Sanford plant to coal, cooling water was assumed to be circulated through a cooling pond with no discharge to other surface waters. Additional wastes from coal pile runoff, metal cleaning operations, and bottom ash handling were assumed to be treated to the same effluent concentration as the treated waste from the proposed project and then discharged to the St. Johns River. Because the FGD system for the NSPS case of Sanford coal conversion would not produce a commercial grade gypsum, it can be operated without a wastewater discharge. This FGD system was selected because there is no nearby market for gypsum at Sanford. There is a potential market in Jacksonville, however.

In order to compare the proposed project with the No Action Alternative and Alternatives 1 through 4, eight parameters were selected for analysis. Chlorine and heat were selected because they are the primary pollutants associated with cooling tower discharges. The six other parameters (oil and grease, copper, iron, mercury, aluminum, and silver) were selected because concentrations of these pollutants occasionally exceed State standards in the St. Johns River.

The results of this analysis are presented in Table 4.3-5. The No Action Alternative has no associated changes in pollutant mass loadings. The following discussion focuses on pollutant mass loadings in Jacksonville, Sanford, the FP&L service area outside Sanford, and the total loading changes for the FP&L and JEA service areas.

Jacksonville

The proposed project and the four alternatives would result in a decrease in chlorine and heat discharges. Alternative 1 would reduce thermal discharges the most. The difference in chlorine discharges between the proposed project and Alternatives 1, 2, and 3 would not be significant, and all are considered equally successful in decreasing chlorine discharges. The proposed project would result in the greatest increase in the discharge of the remaining pollutants while Alternatives 1 and 2 would cause the smallest increases in pollutant loads. Overall, Alternative 2 would be the most beneficial and Alternative 1 would be the second most beneficial option with respect to surface water concerns for Jacksonville.

Sanford

The proposed project and Alternative 1 would result in no changes in water quality at Sanford. Alternatives 2, 3, and 4 would increase pollutant loadings and therefore decrease water quality at Sanford.

FP&L Except Sanford

Alternative 1 is the only alternative that would affect surface water quality in the FP&L service area outside of Sanford. Based on the assumptions of the analysis, this alternative could result in a net decrease in chlorine

Table 4.3-5. Net change from existing conditions of annual pollutant loadings to the surface waters of Jacksonville, Sanford, and peninsular Florida for the proposed project and alternatives.

Jacksonville

	No Action	Proposed Project	Alt 1	Alt 2	Alt 3	Alt 4
Chlorine (lb/yr)	0	-19,800	-18,508	-21,520	-20,998	- 8,840
Heat (10^6 BTU/hr)	0	- 1,462	- 2,676	- 1,654	- 1,597	- 882
Oil and Grease (lb/yr)	0	+84,580	+ 1,003	0	+25,380	+16,300^{1} + 1,510^{2}
Copper (lb/yr)	0	+ 5,640	+ 67	0	+ 1,692	+ 1,089^{1} 101^{2}
Iron (lb/yr)	0	+ 5,640	+ 67	0	+ 1,692	+ 1,089^{1} 101^{2}
Mercury (lb/yr)	0	+ 210.9	+ 2.5	0	+ 63.3	+ 4.1^{1} 0.4^{2}
Aluminum (lb/yr)	0	+ 789.4	+ 9.4	0	+ 236.8	+ 152.4^{1} 14.1^{2}
Silver (lb/yr)	0	+ 32.7	+ 0.4	0	+ 9.8	+ 6.3^{1} 0.6^{2}

Sanford

	No Action	Proposed Project	Alt 1	Alt 2	Alt 3	Alt 4
Chlorine (lb/yr)	0	0	0	0	0	0
Heat (10^6 BTU/hr)	0	0	0	0	0	0
Oil and Grease (lb/yr)	0	0	0	+ 7,600^{1,2}	+ 7,600^{1,2}	+ 7,600^{1,2}
Copper (lb/yr)	0	0	0	+ 500^{1,2}	+ 500^{1,2}	+ 500^{1,2}
Iron (lb/yr)	0	0	0	+ 500^{1,2}	+ 500^{1,2}	+ 500^{1,2}
Mercury (lb/yr)	0	0	0	+ 18.7^{1,2}	+ 18.7^{1,2}	+ 18.7^{1,2}
Aluminum (lb/yr)	0	0	0	+ 139.3^{1,2}	+ 139.3^{1,2}	+ 139.3^{1,2}
Silver (lb/yr)	0	0	0	+ 2.9^{1,2}	+ 2.9^{1,2}	+ 2.9^{1,2}

FP&L Except Sanford

	No Action	Proposed Project	Alt 1	Alt 2	Alt 3	Alt 4
Chlorine (lb/yr)	0	0	-19,468	0	0	0
Heat (10^6 BTU/hr)	0	0	2,140	0	0	0
Oil and Grease (lb/yr)	0	0	+ 640	0	0	0
Copper (lb/yr)	0	0	+ 43	0	0	0
Iron (lb/yr)	0	0	+ 43	0	0	0
Mercury (lb/yr)	0	0	+ 1.6	0	0	0
Aluminum (lb/yr)	0	0	+ 6.0	0	0	0
Silver (lb/yr)	0	0	+ 0.2	0	0	0

Total

	No Action	Proposed Project	Alt 1	Alt 2	Alt 3	Alt 4
Chlorine (lb/yr)	0	-19,800	-37,976	-21,520	-20.998	- 8,840^{1,2}
Heat (10^6 BTU/hr)	0	- 1,462	- 4,816	- 1,654	- 1,597	- 882^{1,2}
Oil and Grease (lb/yr)	0	+85,580	+ 1,640	+ 7,600	+32,980	+23,900^{1} 9,100^{2}
Copper (lb/yr)	0	+ 5,640	+ 110	+ 500	+ 2,192	+ 1,589^{1} + 601^{2}
Iron (lb/yr)	0	+ 5,640	+ 110	+ 500	+ 2,192	+ 1,589^{1} 601^{2}
Mercury (lb/yr)	0	+ 210.9	+ 4.1	+ 18.7	+ 82.0	+ 22.8^{1} + 19.1^{2}
Aluminum (lb/yr)	0	+ 789.4	+ 15.4	+ 139.3	+ 376.1	+ 291.7^{1} + 151.4^{2}
Silver (lb/yr)	0	+ 32.4	+ 0.6	+ 2.9	+ 12.7	+ 9.2^{1} + 3.5^{2}

[1] NSPS

[2] SIP

and heat discharges and a net increase in discharges of other pollutants. Overall, Alternative 1 appears to be the preferred alternative for this study area because of the substantial potential decrease in chlorine discharges.

JEA/FP&L Total Systems

For Florida as a whole, Alternative 1 would be most beneficial since it results in the greatest reduction in heat and chlorine discharges and the smallest increase in discharges of the pollutants of concern. The proposed project would increase most pollutant loads significantly. Only chlorine and heat discharges would be reduced.

4.4 GROUNDWATER IMPACTS

4.4.1 Construction-Related Impacts

Construction impacts on groundwater resources are associated with dewatering for deep excavations and discharges to the shallow aquifer system in the form of leachate from sediment and waste disposal ponds. The construction impacts of the proposed SJRPP and the alternatives are evaluated on the basis of the need for excavation dewatering and the potential for leachate from treatment ponds. A summary of the types of construction activities which would occur under the proposed project and the alternatives that could potentially impact groundwater resources is presented in Table 4.4-1.

4.4.1.1 Proposed Action (SJRPP)

The primary impact of construction on groundwater resources occurs during dewatering for excavations of foundations and structures. Construction of the SJRPP will require excavation of a coal and limestone unloader pit with surface dimensions of 400 feet by 400 feet, basal dimensions of 80 feet by 80 feet, and a depth of 70 feet (JEA/FP&L 1981a). This excavation will penetrate the full thickness of the water table aquifer and intermediate sands, and the uppermost portions of the shallow rock aquifer. This activity could require groundwater pumping of up to 1,000 gallons per minute (gpm) for a period of up to one year and could draw down water levels in the plant area. The extent of drawdown of the shallow aquifer during construction will be limited to the immediate vicinity of the plant by the use of groundwater control measures such as sheet pilings, slurry walls, grout curtains, dewatering wells constructed on benches within the excavations, or other methods (JEA/FP&L 1981a). Groundwater movement and quality during construction will be monitored at observation wells on-site to detect drawdown and/or contamination.

Other excavation activities limited to depths of 20 or 30 feet will require dewatering of the shallow water table aquifer for periods of less than one year in duration. This dewatering will drawdown the water table aquifer in the vicinity of the SJRPP but the extent of drawdown is expected to be limited by the low hydraulic conductivity of the aquifer. Drawdown due to shallow excavation will not affect any wells in the area since there are no wells completed in the water table aquifer in the vicinity of the SJRPP.

Dewatering activities are not expected to affect the Floridan Aquifer due to its depth and separation from the shallow aquifer system by the Hawthorne Formation. No Floridan Aquifer recharge areas are located on the SJRPP site and therefore will not be affected.

Table 4.4-1 Construction dewatering and treatment pond requirements of the proposed project and the alternatives.

	Requires Dewatering of Large Deep Excavation	Requires Dewatering of Shallow Foundation	No Dewatering Required	Construction Runoff/Waste Pond
SJRPP	X	X	-	X
No Action	-	-	X	-
Alternative 1				
Solar Water Heaters	-	-	X	-
Municipal Refuse-Fired Plants	-	X	-	X
COM (NGS, Unit 3)	-	X	-	X
Purchased Power - Rights-of-Way	-	X	-	-
Alternative 2				
Purchase Power - Rights-of-Way	-	X	-	-
Sanford Conversion	X	X	-	X
Alternative 3				
Purchase Power - Rights-of-way	-	X	-	-
Sanford Conversion to Coal	X	X	-	X
Build New 250 MW Coal-fired Power Plant	-	X	-	X
Alternative 4				
Purchase Power - Rights-of-Way	-	X	-	-
Sanford Conversion	X	X	-	X
Northside Coal Conversion	-	X	-	X

During the construction of SJRPP approximately 300 acres of land within the railroad loop will be cleared. Temporary sedimentation ponds will be located southeast of the railroad loop and within the area enclosed by the loop (JEA/FP&L 1981b). These ponds will control site runoff, suspended sediment, washout from the washing of concrete trucks, effluent from oil-water separators serving the refueling areas, treated effluent from the sanitary waste treatment facility, flushwater, and associated debris (JEA/FP&L 1981a). At present the utilities do not propose to line the construction phase sedimentation ponds. Therefore, these ponds are a potential source of groundwater contamination. Although the projected quality of leachate or effluent from these ponds has not been determined, they are expected to treat mostly (90%) uncontaminated site runoff and should be relatively clean. Therefore, the effect of leachate from the construction sediment ponds is not anticipated to be a major concern.

4.4.1.2 Alternative 1

No deep excavations would be associated with any of the facilities proposed in Alternative 1. Municipal refuse-fired plants are designed with a tipping floor truck unloading system, but this is expected to require a relatively shallow excavation (20 to 30 feet). Relatively shallow excavations would be required for new facilities associated with the NGS COM conversion. If deep borings are required for construction of powerline towers, dewatering would be of short duration and would affect a small area.

4.4.1.3 Alternative 2

This alternative requires the construction of transmission line towers for the purchase of power as previously discussed and the conversion of Sanford Units 4 and 5 to coal. The Sanford conversion may require a deep excavation for a coal and limestone unloader pit. Since these units would be rated at 635.2 MW after conversion, it is assumed that the unloader pit will be a deep excavation approximately one-half the size of the SJRPP's and that construction and dewatering will require less time than expected for the SJRPP pit construction. The impact on groundwater resulting from dewatering could be further reduced by the use of grout curtains, sheet pilings, and slurry walls. For the Sanford coal conversion it is assumed that construction phase sediment ponds would be lined with an impermeable liner, thereby eliminating the possibility of leachate contamination of the groundwater.

4.4.1.4 Alternative 3

This alternative also requires construction of rights-of-way for the purchase of power and the conversion of Sanford Units 4 and 5 to coal. Impacts resulting from these activities are the same as those discussed in the preceding sections. The construction of a new 280 MW coal-fired plant by JEA will require a coal and limestone unloader pit of a size assumed to be one-fourth that of the SJRPP pit. This pit is assumed to be relatively shallow. Other excavations for this plant are expected to be shallow and would require no dewatering of the shallow rock aquifer. Assuming the use of appropriate dewatering controls and a lined sediment pond, groundwater should not be adversely affected by construction of this unit.

4.4.1.5 Alternative 4

This alternative requires the construction of rights-of-way for purchased power and the conversion of Sanford Units 4 and 5 to coal with resultant impacts as discussed for the preceding alternatives. The conversion of NGS Unit 3 to coal will require a coal and limestone unloader pit one-fourth the size of the SJRPP's. This is assumed to be a shallow excavation requiring no dewatering of the shallow rock aquifer.

4.4.1.6 Comparison of Impacts

Since the SJRPP would require the largest construction effort including deep excavation and an unlined treatment pond, it has a greater potential for impact on groundwater resources than the alternatives. Alternatives 2, 3, and 4 involve the conversion of existing oil-fired plants and will also require dewatering for unloading pits. The dewatering will be less extensive than that required for the SJRPP, however. Some shallow foundation excavation dewatering may be required at the alternative construction sites, although the dewatering volume is assumed to be relatively small compared to the SJRPP. Overall, Alternative 4 has a greater potential for construction impacts on groundwater resources than the other alternatives because of the two coal conversions involved.

4.4.2 Operation-Related Impacts

Impacts on groundwater during the operation of the SJRPP could occur as a result of withdrawals from aquifers and discharges to aquifers. Withdrawal of large quantities of water from the Floridan Aquifer potentially could draw down the level of the Aquifer and affect the yield and quality of other nearby wells. However, the St. Johns River Water Management District believes that the project will probably not cause severe drawdowns or loss of artesian flow in surrounding wells. Also, discharges to aquifers from landfills and waste pond leachate could affect the quality of the shallow aquifer system. Presented in Table 4.4-2 is a summary of the net groundwater requirements of the proposed project and the alternatives. The nature and relative extent of potential impacts on groundwater from the SJRPP and the alternatives is described in the following sections.

4.4.2.1 Proposed Action (SJRPP)

Withdrawals from Aquifers at SJRPP

Operation of the SJRPP would require a moderately large use of groundwater to produce a marketable gypsum product from the FGD system. Other major uses of groundwater at the SJRPP include potable water supply, fire protection, plant service water, and makeup to the boiler water demineralizer system. The St. Johns River Water Management District has found these withdrawals acceptable.

Groundwater will be supplied by four wells (A, B, C, and D) one of which will be essentially a standby well and one (A) which will serve primarily as a monitoring well. All wells will be drilled to approximately [illegible] feet so as to penetrate the Ocala Limestone (Floridan Aquifer). Wells B, C, and D will be completed with an 18-inch casing to accommodate pumps capable of producing

Table [illegible].4-2. Comparison of the net change in operational groundwater requirements (in gpm) of the proposed action and the alternatives.

	Jacksonville avg/max	Sanford	Other	Total avg/max
No Action	0	0	0	0
SJRPP	+ 3,546/5,295	0	0	-
Alternative 1				
Solar Hot Water	0	0	0	0
Municipal Refuse	7	0	0	7
NGS COM Conversion	- 292	0	0	- 292
Purchased Power	0	0	0	0
Alternative 2				
Sanford Coal	0	0	0	0
Purchased Power	0	0	0	0
Alternative 3				
Sanford Coal	0	0	0	0
Purchased Power	0	0	0	0
280 MW Coal Plant	+ 902/1,377	0	0	902/1,377
Alternative 4				
Sanford Coal	0	0	0	0
Purchased Power	0	0	0	0
NGS Coal (SIP)	- 205	0	0	- 205
NGS Coal (NSPS)	+ 393	0	0	+ 393

at least 1,800 gpm. The applicants may decide to utilize pumps with nominal yields of greater than 1,800 gpm in order to reduce the daily pumping duration. The operation of pumps will be controlled by the requirements of plant operations and maintenance of adequate water storage capacity. Two of the main wells will operate continuously to meet the average demand of 3,546 gpm. The third well would then be available to supply the instantaneous maximum demand of 5,295 gpm (JEA/FP&L 1981b). The maximum demand pumpage will be required for a period of no more than 24 hours. Although deep well A will be used primarily to monitor drawdown, a 100 gpm pump will be installed for an emergency standby groundwater supply source. Since only two wells are required for average groundwater use, their operation will be alternated to provide routine maintenance.

No SJRPP groundwater production wells have been planned for the shallow aquifer system. However, monitoring wells will be utilized to detect any contamination of the shallow aquifer that might occur.

Groundwater Drawdown At SJRPP

The effects of the average groundwater drawdown of the Floridan Aquifer have been estimated assuming that two wells produce 1,800 gpm long enough to establish a steady-state cone of depression (Vergara 1981). Using this approximation of average pumping conditions, a drawdown of approximately 15 feet was calculated at the nearest site boundary and 9 feet at the nearest off-site well (Well D-1255, Figure 4.4-1). Under average pumping conditions, approximately 66 Floridan Aquifer wells could be affected by a drawdown of 2 to 4 foot and approximately 137 wells could experience a drawdown of 1 to 2 feet. The 1 foot drawdown contour is approximately an 11,000 foot circle of radius and the 2 foot drawdown contour is an 8,000 foot circle of radius centered at the midpoint between wells B and D. Analysis of pumping at a non-steady state rate of 5,400 gpm (the maximum expected rate) indicated a maximum drawdown of 25 feet at the site boundary and 14 feet at the nearest off-site well (Well D-1255). Fifty off-site Floridan Aquifer wells would experience drawdowns of 1 foot and 31 could experience a drawdown of 2 feet. A one foot drawdown would occur within a circle 14,000 feet in radius and a 2 foot drawdown would occur within a circle 11,000 feet in radius from a point centered between wells B and D (Figure 4.4-2). Impacts from pumping at this maximum rate would be short-term (for a period of less than 24 hours).

Analysis of the most recent potentiometric surface maps (September 1980) shows that artesian flow from the Floridan Aquifer occurs in the area at a head of approximately 15 to 20 feet above land surface. Thus, with an average case drawdown of 9 feet at the nearest well, it would appear that no wells in the area would lose artesian flow solely as a result of average pumpage for the proposed plant. It is recognized that the rates of discharge will decrease, thus causing pumped wells to operate longer to produce a given quantity of water. For those users currently utilizing artesian wells the flow could be substantially reduced, possibly necessitating the use of pumps to deliver the same quantity of water.

Under maximum use conditions it was predicted that nine inventoried wells and seven potential wells in the area could expect drawdowns of greater than 6 feet (Vergara 1981). This modeled maximum drawdown condition will have the greatest impact on Well D-1255, reducing its pumped production. Other wells

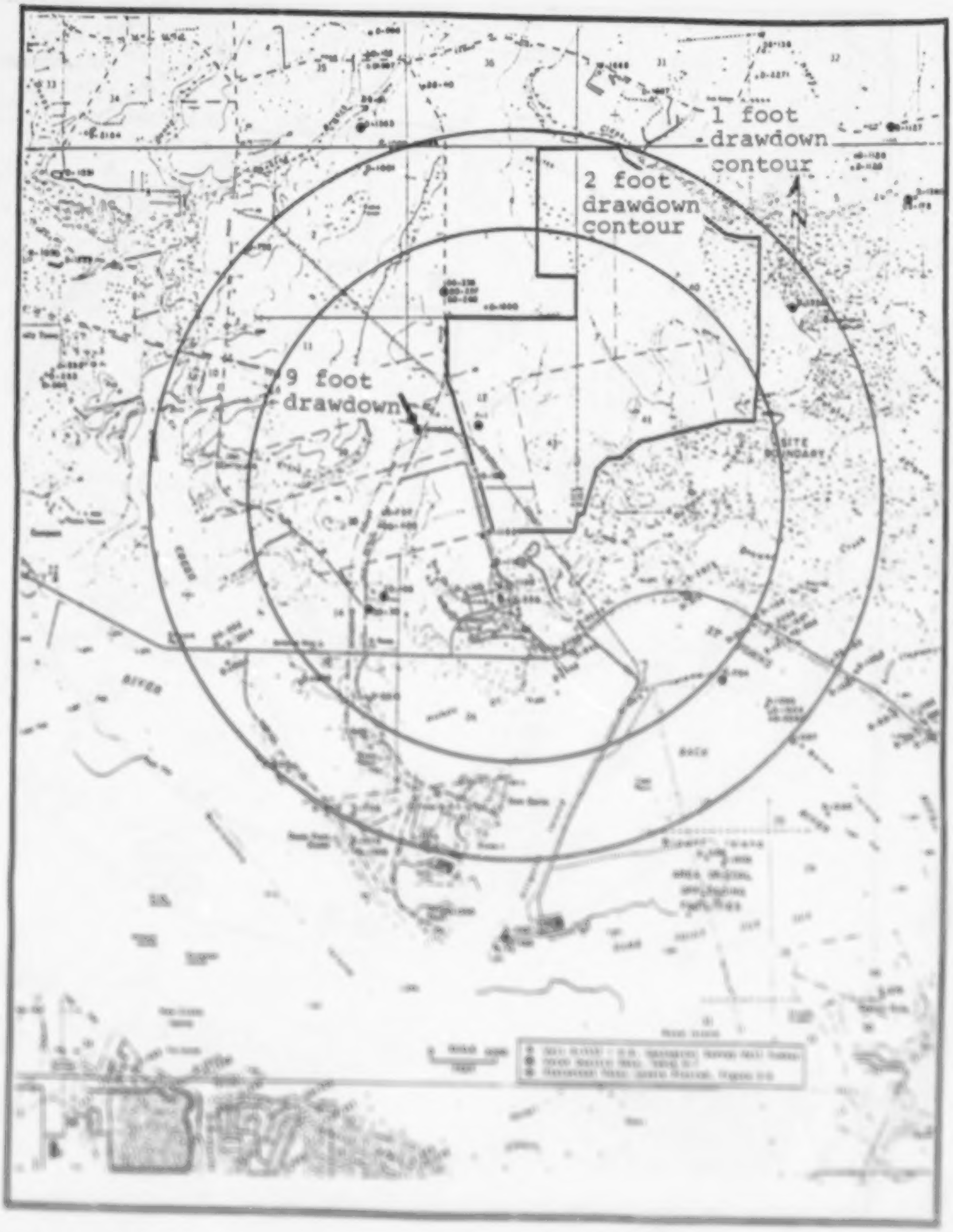
1 foot
drawdown
contour
2 foot
drawdown
contour
9 foot
drawdown
SITE BOUNDARY
RIVER

Figure 4.4-1. Cone of depression around SJRPP for two wells discharging 3,600 gpm (average pumping condition)(adapted from JEA/FP&L 1981a and Vergara 1981).

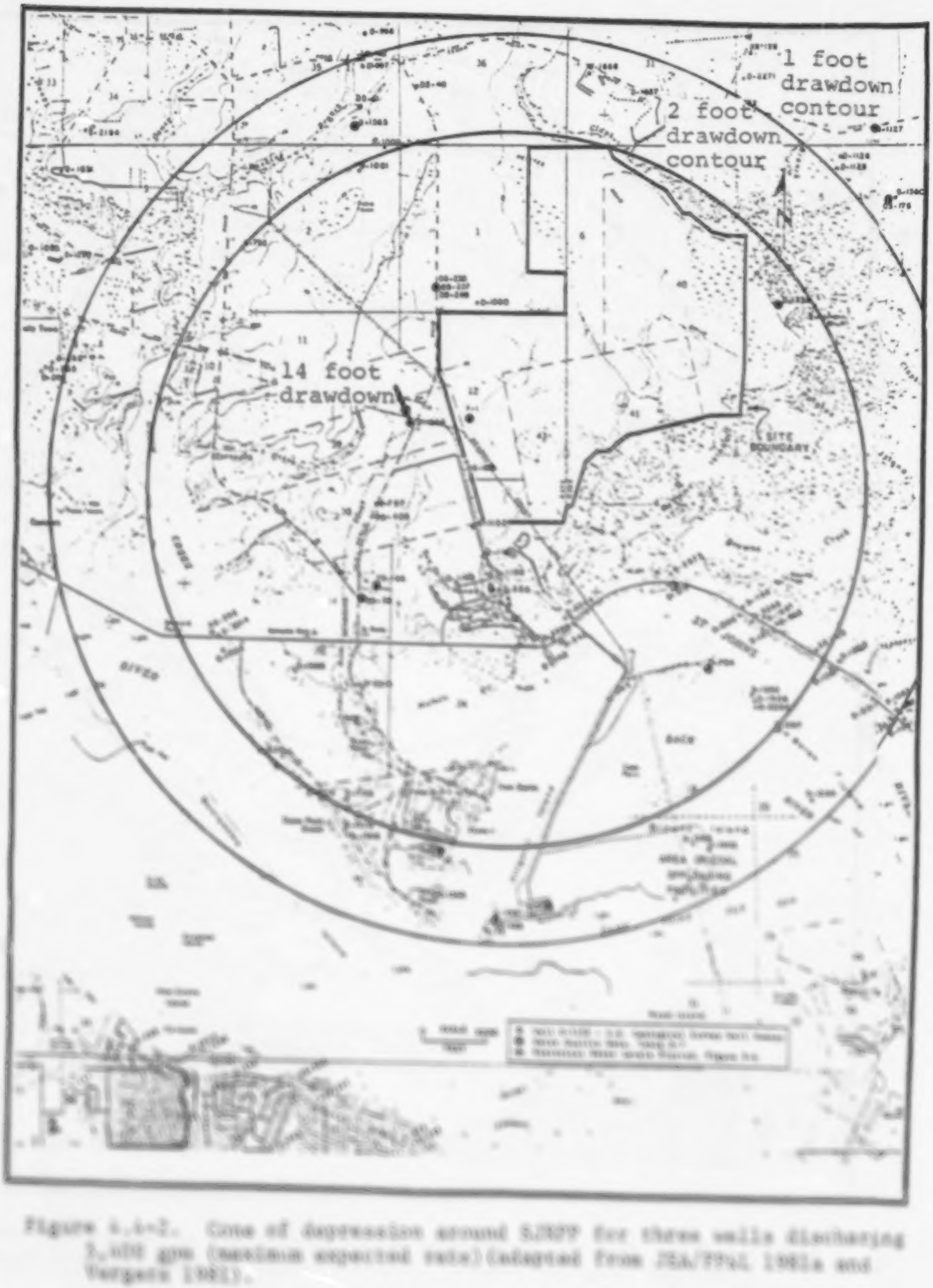
1 foot drawdown contour
2 foot drawdown contour
14 foot drawdown
SITE BOUNDARY

Figure 4.4-2. Cone of depression around SJRPP for three wells discharging 3,400 gpm (maximum expected rate)(adapted from JEA/FP&L 1981a and Vargeese 1981).

similarly situated would also be affected in this general manner. During the duration of time that maximum pumping occurs at the plant site, other known and potential wells in the drawdown zone would have to flow or be pumped for longer periods of time to deliver a set volume of water (Vergara 1981).

Drawdown of the Floridan Aquifer is not expected to affect the shallow aquifer system since they are separated by the Hawthorn Formation which acts as an aquiclude. No production wells are planned to be completed in this system for SJRPP; therefore no decline in the shallow water table level is expected.

Chloride Intrusion at SJRPP

Pollution of the Floridan Aquifer in the Jacksonville area by intrusion of conate water with high concentrations of chlorides has been associated with high rates of pumping. Within the immediate vicinity of the SJRPP site, chloride concentrations average 20 to 30 mg/l with a few exceptions (Section 3.3). Higher chloride concentrations in the Floridan Aquifer have been associated with high production wells in the lower part of the upper permeable zone. The wells at SJRPP will be completed in the upper part of the upper permeable zone in order to minimize chloride intrusion. Nonetheless, any additional pumping of the Floridan Aquifer is likely to result in increases in chloride levels since gradual increases have been correlated with increased use (Leve 1966 in JEA/FP&L 1981a).

Chloride pollution of the shallow aquifer system is not expected to result from pumping from the Floridan Aquifer. There is a potential for pollution of the water table aquifer, however, as a result of water leaching through landfilled solid waste and unlined sediment ponds serving solid waste storage areas.

Discharges to the Shallow Aquifer

JEA and FP&L hope to market high volume wastes including FGD sludge, fly ash, and bottom ash. JEA proposes to dispose of unmarketed high volume wastes and some small volume solid wastes in on-site landfill cells lined with a material of moderately low permeability (9 x 10^{-4} cm/sec). JEA will also conduct a five year study to determine the most acceptable method for disposing of solid wastes for the life of the plant. Seepage of water through wastes stored on the SJRPP site could leach potentially toxic substances from ash and FGD sludge into the adjacent soil and groundwater. The exact quality of leachate from these sources is dependent on the chemical content of the coal to be burned at SJRPP which is unknown at this time (for estimated minimum and maximum values of leachate constituents as reported in the literature see Table 4.3-3, Section 4.3.2.2.) The impacts of the leachate on groundwater will depend on the effectiveness of the protective measures employed.

As indicated in Section 3.4, the soils at the SJRPP site are mostly sands with high permeability and little cation exchange capacity. As a result, the potential for leaching of contaminants from the solid waste disposal areas to the groundwater is high. Most leachate from the site is expected to be contained within the water table aquifer and should flow downgradient from the site to Browns Creek and Clapboard Creek. The impact of leachate on Browns Creek is discussed in Section 4.3.2.2.

Presently there are no wells in the vicinity of the SJRPP which utilize the water table aquifer. The separation between the water table and underlying shallow rock aquifer is limited in extent; therefore it is possible that any leachate which is not contained within the water table aquifer could percolate down into the shallow rock aquifer. There are wells in the vicinity of the SJRPP which utilize the shallow rock aquifer and which could potentially be impacted by a deterioration in water quality. The extent of such contamination is unknown but, it appears that most of the leachate would probably be retained in the water table aquifer and any leachate which did reach the shallow rock aquifer would be highly diluted. Should the utilities be successful in finding a market for their waste material or should the solid waste disposal cells be lined with an essentially impermeable liner (1×10^{-7} cm/sec permeability), the impacts on groundwater due to leachate would be greatly reduced. However, due to the unknown effects of the proposed project on the quality of the shallow aquifers and the long-term contribution of the proposed groundwater withdrawal to chloride contamination of the Floridan Aquifer, major long-term adverse impacts on groundwater resources could occur.

4.4.2.2 No Action Alternative

This alternative requires the continued use of approximately 764 gpm by the existing NGS. Under the No Action Alternative the potentiometric surface of the Floridan Aquifer in the vicinity of NGS would continue to decline at approximately the same rate (0.4 to 0.5 feet per year) as had been observed in the past and chloride levels would remain relatively stable. Also, there would be no increase in the discharge of pollutants to the shallow aquifer system.

4.4.2.3 Alternative 1

Parts of this alternative requiring insignificant quantities of groundwater include residential solar water heaters, municipal refuse-fired plants, and purchased power. The major identified use would be JEA's conversion of NGS Units 1 and 3 to coal-oil mixtures. Approximately 472 gpm of groundwater is expected to be used for the bottom ash system, demineralizer, and the boiler blowdown system. This would be a decrease of 292 gpm from existing conditions and could reduce drawdown and chloride intrusion in the area. Leachate discharges to the shallow aquifer system would decrease under Alternative 1 since approximately 628,248 tons per year of municipal and industrial solid waste could be displaced by refuse-fired plants.

4.4.2.4 Alternative 2

This alternative also would require a small use of groundwater. No groundwater would be used due to the purchase of power and only 222 gpm is estimated to be used for the Sanford conversion to coal. Resultant drawdown and chloride intrusions would remain stable since the groundwater used is assumed to be the same as under current conditions. Little increase in the leachate discharged to the water table aquifer is expected from the increased high volume solid waste produced by coal combustion due to the fact that lined waste disposal cells would be used.

4.4.2.5 Alternative 3

The only distinction between Alternatives 2 and 3 is the construction of a new 280 MW coal-fired plant by JEA. It is estimated that this plant will require only 25% of the groundwater estimated to be used at the SJRPP (902 gpm average and 1,377 gpm maximum). This reflects the intent to produce a marketable FGD sludge and represents the next largest use of groundwater when compared to SJRPP and the other alternatives. Some drawdown and an increase in chloride levels would be expected. These would be proportionally lower than for the SJRPP, however. Because the landfill cells would be lined with an impermiable material, leachate from high volume solid waste would not be expected to constitute a problem. If the high volume solid wastes could be marketed, landfilling impacts would be reduced to a negligible level.

4.4.2.6 Alternative 4

This alternative includes purchase of power and the conversion of Sanford Units 4 and 5 to coal, as previously discussed under Alternatives 2 and 3. In addition, this alternative requires the conversion of the NGS Unit 3 to coal which is expected to require 559 gpm of groundwater under the SIP option and 1,157 gpm under the NSPS option. These amounts represent changes from existing conditions of -205 and +393 gpm, respectively. The additional use of groundwater under NSPS is required to produce a marketable grade of gypsum.

Groundwater impacts could vary under this alternative depending on whether the SIP or NSPS are used. Under either case groundwater use will be lower than SJRPP. Leachate discharges to the shallow aquifers system will increase over the No Action Alternative since some bottom ash and fly ash is assumed to be landfilled.

4.4.2.7 Comparison of Operation-Related Impacts

For the Jacksonville area the SJRPP would have the greatest potential impact on groundwater resources because of the larger volumes of groundwater withdrawn and the large quantities of solid waste which may have to be disposed of on-site. Alternative 3 would have the next largest impact due to the operation of the small coal-fired plant adjacent to NGS. The Alternative 3 NSPS case would have only a slightly larger effect than either the No Action Alternative or the Alternative 3 SIP case. Alternative 2 would reduce groundwater use and solid waste generation in Jacksonville.

For the Sanford area there would be little change in groundwater use under any of the alternatives since it was assumed that surface water would be used for all increased water needs. Also, because all solid waste disposal areas would be lined, there would be little increase in potential groundwater contamination under any of the alternatives.

For other areas within the FP&L service area Alternative 1 could result in some overall benefit due to the reduction in the amount of solid waste generated (see Section 4.5.3). There would be only a negligible change in groundwater use for these areas under any of the alternatives. Overall, the SJRPP has the greatest potential for major adverse impacts on groundwater resources of any of the alternatives.

4.5 EARTH RESOURCES

4.5.1 Construction Impacts

4.5.1.1 Topography

The construction of the proposed power plant at SJRPP or the implementation of any one of the alternatives which call for construction of new facilities upon natural terrain will cause changes in the natural topography. Land surfaces will be permanently altered and natural areas lost due to the construction of plant facilities, waste disposal areas, landfills, and pond areas.

4.5.1.2 Soils

The surface soil conditions at the SJRPP-NGS site are described by the Soil Conservation Service as fine sandy soils that are generally unsuitable for construction applications due to high permeabilities, excessive wetness, normally high water tables, and susceptibility to seepage. The results of soil test borings at the SJRPP/NGS sites indicate that the surface soils conform to SCS descriptions (USDA 1978, 1980) by being loose to very loose fine sandy soils. These conditions indicate that during construction of plant facilities properly designed deep foundations must be built so as to ensure stability in wet, sandy soils. Designs similar to those used at the Northside Generating Station should prove satisfactory for plant facilities.

The soils found on the SJRPP-NGS site and on the Sanford Plant site are fine, sandy soils that are generally unacceptable for use in coal storage piles, waste disposal and landfill, diversion structures, and sedimentation ponds. High permeabilities and a low clay content indicate that seepage can occur through these soils into shallow aquifers and surface waters. Leachates can pass from disposal areas into shallow aquifers and surface waters if adequate engineering practices (e.g., use of liners) are not adhered to. Impacts upon the local hydrogeology are possible (Section 4.4).

4.5.1.3 Geology

The geology of the proposed site areas (SJRPP and Alternatives 1 through 4) will not change due to the construction of any of the facilities. Construction and operational impacts on local geology will be insignificant. Geological impacts associated with groundwater hydrology are discussed in Section 4.4.

4.5.2 Operation Related Impacts

Impacts on earth resources due to the operation of the proposed project and the alternatives are directly related to solid waste generation and disposal (Section 4.5.3) and groundwater hydrology (Section 4.4). Direct impacts on soils, topography, and local geology are not expected to be significant.

4.5.3 Generation and Disposal of Solid Waste

4.5.3.1 Construction-Related Impacts

It is assumed that solid waste generation and disposal during construction will be similar for the SJRPP and the alternatives and will differ only in the volume of waste generated and the amount of land required for disposal of the waste. Construction-related solid waste handling practices will be similar for most of the alternative sites that are wooded with the possible exception of the wetland areas on the SJRPP site. Contractors will timber the sites for marketable pine pulpwood and hardwoods. After harvesting, the construction areas will be cleared and grubbed. Solid waste will be burned or buried in accordance with local and State requirements (JEA/FP&L 1981b). It is assumed that clearing and disposal operations similar to those used for the initial clearing of plant sites will be employed during construction of transmission lines.

Construction waste materials, such as scrap wood and iron, will be taken to a specified open area of the site where they will be separated and stockpiled for possible reuse or salvage. Garbage generated by the construction work force will be deposited in designated containers and disposed in dumpsters for collection and disposal at designated county or municipal landfills near the site. Sludges generated from construction phase operation of the central wastewater treatment facility, sanitary wastewater treatment facility, and metal cleaning waste retention basin will be disposed of in the same manner proposed for the similar operational phase solid wastes. Sanitary waste sludges will be disposed of offsite. Sludges from the central wastewater treatment plant will be disposed in on-site landfills. If sludges from the metal cleaning waste retention basin are found to be hazardous due to their high corrosivity, they will be disposed of offsite by a RCRA permitted contractor; otherwise they will be disposed on-site.

It is estimated that Alternative 2 would generate the largest amount of solid waste due to the construction of 150 miles of transmission lines and the clearing of additional land for the Sanford coal conversion. Alternative 1 would generate only slightly less waste due to transmission line construction and the NGS COM conversion but the refuse plants would offset the need for clearing additional landfill areas. It is assumed that installation of residential solar water heating systems would generate little waste material. The proposed project (SJRPP) would require clearing of the plant site, waste disposal areas, the Blount Island site, an undetermined amount of right-of-way, and also involves disposal of 550,000 cubic yards of dredge materials from the construction of the Blount Island facility on Quarantine Island. This would probably generate less construction waste material than Alternatives 1 and 2 because of the much smaller amount of land clearing involved. Alternatives 3 and 4 would require the least amount of clearing and site preparation and would probably generate the least construction waste.

4.5.3.2 Operation Impacts

Fossil fueled electric generating systems produce large volumes of solid waste from combustion and from the major pollution control systems. Those produced in the largest quantity are bottom ash, fly ash, and sludge from the flue gas desulfurization (FGD) system. Much smaller quantities of sludge are produced from sediment ponds, cooling towers, and wastewater treatment systems. High volume solid wastes have been determined to be non-hazardous as defined by Subtitle C of the 1976 Resource Conservation and Recovery Act (RCRA). Based on classification criteria in the Florida State Solid Waste Plan, coal-fired power plant high volume solid wastes can be disposed of in a Class I sanitary landfill (Appendix N).

The primary problems associated with disposal of high volume solid wastes from a power plant are the leaching of contaminants from the waste into the groundwater and fugitive dust from handling and disposal of dry ash. Contaminants including metals, radioactive materials, and organic materials from the coal burned at the plant will be largely retained in low concentrations in the high volume waste materials. It is primarily due to the low concentration of pollutants in the high volume solid wastes that these wastes are not defined as hazardous under RCRA. Because the sandy soils of the sites have high permeability and low cation exchange capacity, the potential for impacts of leachates on groundwater quality in the water table aquifer is high. The impacts of solid waste leachates on groundwater and surface water quality are described in Sections 4.4.1 and 4.3.2.2.

Solid waste generation for the SJRPP and the alternatives has been estimated based on expected changes in fuel consumption and pollution control options. The expected net changes in solid waste volumes for each of the major units involved in the alternatives were identified in Chapter 2.0 (Table 2.2-5, SJRPP; Table 2.6-3, refuse plants and NGS COM; Table 2.6-5, Sanford Units 4 and and 5; Table 2.6-7, SJRPP small coal plant; and Table 2.6-9, NGS Unit 3 coal conversion). Presented in Table 4.5-1 is a summary of the net changes in the generation of solid waste that would be expected to occur in Jacksonville, Sanford, and the FP&L system under each of the alternatives. These changes are discussed in the following sections.

SJRPP

As described in Section 2.2.8, all high volume solid waste generated at SJRPP will be marketed if possible to reduce problems associated with waste disposal. It is estimated that 49,147 tons per year (tpy) of bottom ash, 196,673 tpy of fly ash, and 430,000 tpy of FGD sludge will be generated at the plant during full operation. A landfill area totaling 551 acres will be provided for disposal of all wastes which cannot be sold. This volume of landfill will be adequate to contain all of the solid waste generated at the plant. JEA proposes a five-year test program to determine the most economically acceptable way to dispose of excess high volume waste. The utility has proposed that all solid waste not associated with the test program be put into on-site landfill cells of 10 acres each which are above the water table and have soil bottoms compacted to a permeability of approximately 9×10^{-4} cm/sec. Each cell will be filled with layers of solid waste to a height of 60 feet, then sealed with gravel and soil and covered with grass to reduce leachate and fugitive dust emissions. Prior to closure it is estimated that fugitive dust associated with handling dry fly ash will be controlled by mixing the ash with FGD sludge which is 20% by weight moisture.

Compared to the high volume solid wastes, quantities of miscellaneous solid wastes generated by the operation of the plant are very small. These wastes include settled solids from various sedimentation ponds, the metal cleaning waste retention basin, and the cooling tower basin; separated oil and grease from oil-water separators; and sludges from the sanitary waste treatment facility and the central wastewater treatment facility (JEA/FP&L 1981b). Sludge from the sanitary treatment facility will be disposed of off-site.

Table 4.5-1. Net change in high volume solid waste generation for the proposed project and alternatives.

	Jacksonville						Sanford					
	No Action	Proposed Project	Alt 1	Alt 2	Alt 3	Alt 4	No Action	Proposed Project	Alt 1	Alt 2	Alt 3	Alt 4
Bottom Ash (tons/year)	0	49,147	-613,116[1]	-455	12,508	11,611	0	0	0	31,137	31,137	31,137
Fly Ash (tons/year)	0	196,673	42,147	0	50,067	48,032	0	0	0	124,331* 122,925**	124,331* 122,925**	124,331* 122,925**
FGD (tons/year)	0	430,000	0	0	109,435* 0	114,544* 0**	0	0	0	301,326	301,326	301,326
Total High Volume Solid Waste (tons/year)	0	675,820	-570,969	-455	171,555	174,187* 59,643**	0	0	0	456,794* 154,062**	456,794* 154,062**	456,794* 154,062**

	FP&L Except Sanford						Total					
	No Action	Proposed Project	Alt 1	Alt 2	Alt 3	Alt 4	No Action	Proposed Project	Alt 1	Alt 2	Alt 3	Alt 4
Bottom Ash (tons/year)	0	0	-643,685[1]	0	0	0	0	49,147	-1,256,801[1]	30,682	43,645	42,748
Fly Ash (tons/year)	0	0	8,900	0	0	0	0	196,673	51,047	124,331* 122,925**	174,398* 172,992**	172,363* 170,957**
FGD (tons/year)	0	0	0	0	-	-	0	430,000	0	301,326	410,761	415,870
Total High Volume Solid Waste (tons/year)	0	0	-634,785	0	0	0	0	675,820	-1,205,754	456,339 153,607	628,349* 325,617**	630,981* 213,705**

* AFBC

** CFB

[1] [illegible] and bottom ash are considered together for purposes of this comparison table.

Oily wastes will be disposed of off-site, burned in the boilers, or sold to vendors for reuse. Except for the sludges from the metal cleaning waste retention basin, other low volume wastes will be combined with the high volume wastes and disposed of in onsite landfill cells.

Removal of wastes from the metal cleaning waste retention basin will be required once every three to five years, corresponding with the frequency of one or two boiler cleaning operations. Because of the potentially corrosive and toxic nature of the liquid waste held in the basin, the settled solids remaining in the retention basin may be considered hazardous under the rules of RCRA. If the wastes are considered hazardous, JEA intends to have a RCRA permitted contractor remove the wastes from the basin in accordance with the applicable regulations and dispose of them offsite. In this case JEA would also have to design, build, and operate the metal cleaning waste retention basin as a hazardous waste surface impoundment. Should these wastes be determined not to be hazardous, the RCRA permitted contractor requirement will be dropped and on-site disposal will be considered (JEA/FP&L 1981b). For purposes of comparison with the alternatives it is estimated that production of high volume solid waste at SJRPP will displace approximately 910 tpy of bottom ash and 2,025 tpy of fly ash presently generated at the NGS and other stations in the JEA and FP&L systems for a total net increase in solid waste production of 675,820 tpy. This is reflected in Table 4.5-1.

Alternative 1

A net reduction of 570,969 tpy of solid waste in the Jacksonville area would result from Alternative 1. The Duval County refuse plant would burn refuse and produce bottom ash and fly ash with about 12% of the mass of the original waste. The net reduction in solid waste for disposal in the County would reduce the amount of land required as landfill by 265.3 acres over the life of the project. The conversion of NGS Units 1 and 3 to burn COM would increase the production of bottom ash and fly ash at the plant. The displacement of oil-fired power in the JEA system would reduce the production of bottom ash at NGS and other oil-fired stations.

The net effect of Alternative 1 on solid waste generation within the FP&L system would be a reduction of 634,785 tpy. The refuse plants in Seminole, Brevard, Manatee, and Sarasota Counties would reduce the amount of refuse for disposal by 632,800 tpy and reduce the amount of landfill required by a total of 275 acres. Operation of residential solar water heating units and the refuse-fired plants would also reduce the operation of existing oil-fired plants within the FP&L system and displace the generation of fly ash and bottom ash.

Alternative 2

A net reduction of 455 tpy of solid waste in the Jacksonville area would occur under Alternative 2 due to the displacement of oil-fired power by purchased power. No high volume solid waste is assumed to be generated under the purchase of power component of this alternative.

The conversion of Sanford Units 4 and 5 to coal would be expected to produce an additional 456,794 tpy of FGD sludge, bottom ash, and fly ash, under the NSPS option and 154,062 tpy of bottom ash and fly ash under the SIP option. Approximately 88.6 acres of additional landfill area would be required in the SIP case. Under the NSPS option the production of FGD sludge would result in a large increase in the volume of solid waste generated at the Sanford Plant as compared with the SIP option. This would require an additional 194 acres of landfill area around the Sanford Plant. A very small amount of fly ash and bottom ash would be displaced in other parts of the FP&L system due to a reduction in oil burning.

Alternative 3

The conversion of Sanford Units 4 and 5 to coal would generate the same net amount of high volume solid waste as described under Alternative 2. The implementation of Alternative 3 would require the construction of a new 280 MW coal-fired power plant at the SJRPP site and purchase of power. This facility would generate approximately 172,010 tpy of bottom ash, fly ash, and FGD sludge and would require 138 acres of landfill capacity. As in other alternatives, a small reduction in bottom ash production would take place due to oil displacement in the JEA system. This would result in a net increase in solid waste production in Jacksonville of 171,555 typ.

Alternative 4

Solid waste generation under this alternative is the same as Alternatives 2 and 3 for Sanford and the FP&L system. For Jacksonville, JEA would convert its largest boiler, NGS Unit 3, from oil to coal. As in the case of the Sanford coal conversion, both the NSPS and SIP cases are considered. The converted NGS Unit 3 would produce 174,642 tpy of bottom ash, fly ash, and FGD sludge in the NSPS case. The SIP case would be the same less the 114,544 tpy of FGD sludge. An additional landfill area of 37.6 acres would be required for the SIP case and 105.9 acres would be required for the NSPS case. Combined with the bottom ash displaced by the reduction in oil use, the net increase in solid waste generation in the Jacksonville area would be 59,643 tpy for the SIP case and 174,187 tpy for the NSPS case.

Comparison of Operation Impacts

The high volume solid waste produced by the SJRPP, the No Action alternative, and the four additional alternatives will require disposal. If proposed marketing plans as considered for the SJRPP, 280 MW coal plant, and the NGS coal conversion do not materialize, all of the alternatives will require some amount of land to dispose of high volume solid waste. Landfills would have to be large enough to accommodate the high volume solid waste and they would have to be designed to prevent or reduce the leaching and runoff of toxic elements into groundwaters and surface waters. The impacts of solid waste leachates on groundwater and surface water were described previously in Sections 4.4 and 4.3. The cumulative volumes of solid waste produced by the various alternatives can be used as an indicator of the relative impacts of solid waste disposal on earth resources as well as an indicator of potential impacts on groundwater. Presented in Table 4.5-2 is a summary of the total volumes of waste produced and landfill areas required for each of the alternatives considered.

Table 4.5-2. Comparative impact analysis of high volume solid waste production.

Alternative	Total High Volume Waste Production (tpy)			Landfill Area Required (acres)
	Jacksonville	Sanford	FP&L	
SJRPP	675,820	0	0	531
No Action	0	0	0	0
Alternative 1	-570,969	-103,270	-531,515	-515.5
Alternative 2	-455	456,794*	0	194*
		154,062**	0	89**
Alternative 3	171,555	456,794*	0	332*
		154,062**	0	227**
Alternative 4	174,187*	154,062*	0	232*
	59,643**	456,794**	0	127**

*NSPS
**SIP

This comparative analysis indicates that SJRPP will have the highest degree of impact on the Jacksonville area by producing more high volume solid waste than the other alternatives. Alternative 1 will have the least impact on the Jacksonville area since large volumes of refuse will be displaced by refuse-fired power plants. Alternative 2 and the No Action Alternative will result in no change or very little change in the proportion of solid waste in the Jacksonville area and will therefore have no impact. Alternatives 3 and 4 will have a moderate degree of impact on the Jacksonville area since the new 280 MW coal plant and the NGS conversion to coal produce approximately one fourth the solid waste of SJRPP.

Impacts resulting from production of high volume solid waste in the Sanford area are highest for Alternatives 2, 3, and 4 since they all involve conversion of the Sanford Plant to coal. Little or no impacts would result in the Sanford area from Alternative 1, SJRPP, or the No Action Alternative. Other areas served by FP&L would not be impacted by production of high volume solid wastes. Alternative 1 would have a beneficial impact by reducing refuse loads requiring landfilling.

4.6 IMPACTS ON SOUND QUALITY

This section describes the effects of the proposed project and its alternatives on the sound quality in the Jacksonville and Sanford areas. Each alternative is discussed in detail in Chapter 2. The two study areas are the areas that may be affected by noise generated as a result of the proposed projected and its alternatives. Study Area 1 is an area northeast of Jacksonville, Florida (including NGS, the proposed SJRPP site, and the proposed Blount Island facility) and Study Area 2 is an area northwest of Sanford, Florida surrounding FP&L's Sanford Plant.

4.6.1 Construction Impacts on Sound Quality

4.6.1.1 No Action

No noise impact will result directly from the No Action Alternative. Increased traffic noise and increased noise from industrial sources will occur as Study Area 1 becomes increasingly industrialized. Study Area 2 will also not be directly impacted by this alternative. Increased noise in this area due to natural growth will be mininmal as this area is rural in nature.

4.6.1.2 SJRPP

Study Area 1 will experience increased noise levels due to the construction of the proposed project. The highest construction Leq noise level (54.4 dB(A)) will occur for an 18 month period during 1984 and 1985 (Figure 4.6-1). It is predicted that SJRPP construction activities will increase noise levels at the nearest residence (Location 3, Figure 4.6-2) to an L_{eq} of 57 dB(A). This noise level is above the USEPA 55 db(A) L_{eq} guideline for "residences with outside activities" (Appendix S). Other noise sensitive receptors in Study Area 1 will experience noise levels at or below the USEPA guidelines. Short-term impacts are expected from pile driving, steam blowout, and construction-related traffic. During steam blowout, noise levels in excess of 80 dB(A) will be experienced at the nearest residence for a period of three minutes per episode. Steam blowout will occur approximately 20 times over a two week period. There will be an insignificant transportation-related noise increase along roadways leading to the facility except on New Berlin Road which will experience a moderate noise increase of 10 dBA. Implementation of the proposed project will have no effect in the Sanford Plant area as no changes will occur there.

4.6.1.3 Alternative 1

Increased noise from construction activities will result from the conversion of NGS Units 1 and 3 to burn COM and from the construction of a 56.2 MW refuse-fired generating plant at the Jacksonville City Landfill. This construction activity will increase noise levels in Study Area 1 above ambient levels. This increase would not be substantial since considerable noise is presently generated from the existing operation of NGS and the Landfill. The two facilities will not employ enough additional construction personnel to noticeably increase traffic induced noise in the area. Implementation of Alternative 1 will not effect the Sanford Plant area.

The purchase of power and construction of solar water heaters, refuse fired plants, and transmission lines will have variable impacts at unspecified locations. In general, these construction-related noise impacts should be minimal unless construction activity occurs in very close promimity to sensitive receptors.

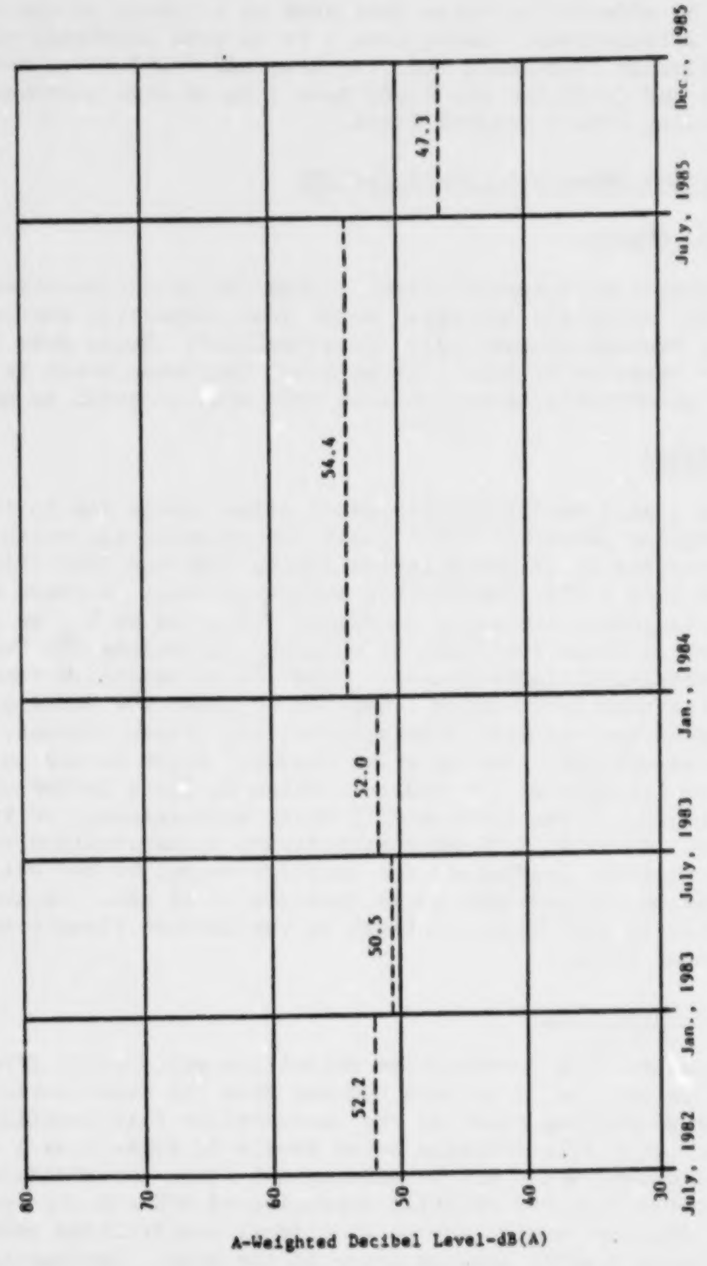

Figure 4.6-1. Projected construction noise levels by construction period at one mile from the proposed SJRPP (JEA/FP&L 1981a).

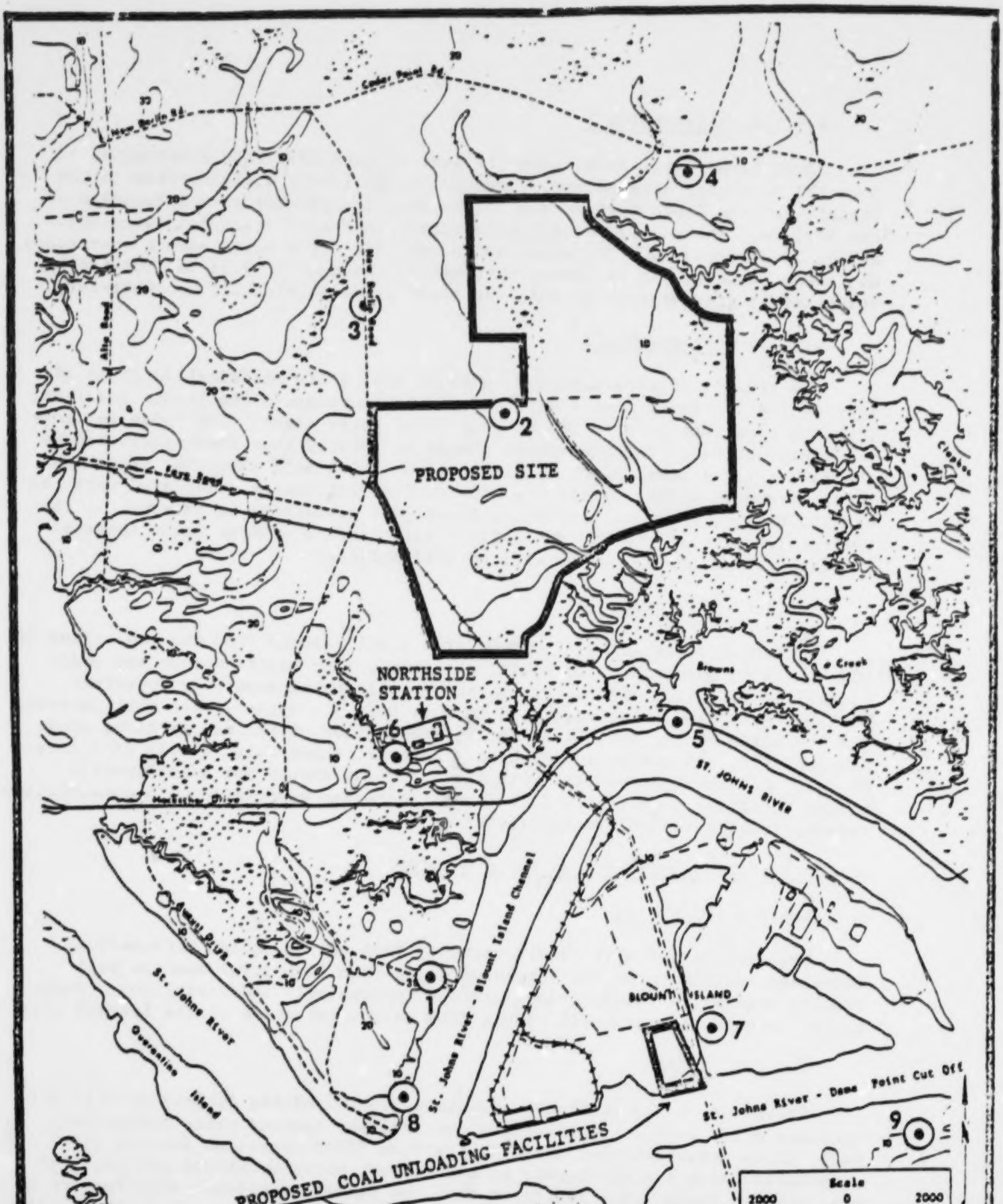
Cedar Point Rd
New Berlin Rd
Alta Road
4
3
2
PROPOSED SITE
NORTHSIDE STATION
6
5
Browns
Creek
ST. JOHNS RIVER
Heckscher Drive
St. Johns River - Blount Island Channel
St. Johns River
Quarantine Island
1
8
BLOUNT ISLAND
7
St. Johns River - Dame Point Cut Off
9
PROPOSED COAL UNLOADING FACILITIES
Noise Survey Monitoring Locations
Scale
2000
0
2000
Feet

Figure 4.6-2. Noise survey monitoring locations in Study Area 1 (JEA/FP&L 1981a).

4.6.1.4 Alternative 2

Study Area 1 will experience the same effects from this alternative as from the No Action Alternative. However, noise levels will increase in the vicinity of the Sanford Plant due to construction related to modification of the boilers. There will be an insignificant increased traffic-induced noise during construction and increased noise resulting from earth moving operations and steam blowout. It is likely that nearby residences would be impacted by noise levels greater than 55 dBA, but these noise levels will be short-term.

4.6.1.5 Alternative 3

The effects of Alternative 3 on Study Area 2 are identical to those of Alternative 2. Study Area 1 will experience increased noise levels resulting from the construction of a 280 MW coal-fired power plant. The noise increase for construction of the powerplant should be greater than that attributed to the refuse-fired power plant of Alternative 1, but less than that attributed to the proposed SJRPP. Since the construction activities associated with the construction of SJRPP only slightly impact one residence, it is expected that the construction of the 280 MW facility will have no adverse noise impacts. Traffic induced noise impacts will be insignificant.

4.6.1.6 Alternative 4

Increased noise levels in Study Area 1 will result from the conversion of NGS Unit 3 to burn coal. In addition to the boiler modifications and additional air pollution control equipment, it will be necessary to construct facilities to handle the coal used to fuel Unit 3. Noise levels will increase due the earth moving activities during preparation of the ash settling pond, ash landfill, and the coal pile area. However, these noise levels will likely be less than those associated with the SJRPP and should not significantly impact sensitive receptors. Noise level increases associated with construction-related traffic will be insignificant.

4.6.2 Operational Impacts on Sound Quality

4.6.2.1 No Action

No noise impact will result directly from the No Action Alternative. Increased traffic noise and increased noise from industrial sources will result, however, as Study Area 1 becomes increasingly industrialized. Similarly, no noise impacts will result from this alternative on the Sanford area.

4.6.2.2 SJRPP

Operation of the SJRPP and associated coal handling facilities will not increase noise levels significantly over present ambient noise conditions. In fact, it is estimated that noise levels from SJRPP operation will be substantially below ambient levels at the nearest noise sensitive receptors at most times. Table 4.6-1 indicates that the nearest residence will receive an L_{eq} noise level of 44 dB(A) from the proposed plant which is 10 decibels below the present noise level at the residence. In addition, since the area is planned to be largely industrial, it is unlikely that there will be an increase in the number of sensitive receptors located in close proximity to the site.

Table 4.6-1. Projected operational noise levels at the nearest residence due to major components of 2-600 MW coal-fired units (JEA/FP&L 1981a).

Component	Level dB(A)[a]	@ Feet	Total Number of Units	Distance to Nearest Residence[b] (feet)	Attenuated Level at Nearest Residence (dBA)
Cooling Tower	76	50	2	3700	38
Forced Draft Fan	85	5	4	5200	31
Induced Draft Fan	85	5	8	5400	34
Primary Air Fan	85	5	4	5200	31
Turbine-Generator	95	5	2	5200	38
Main Transformer	85	5	4	4300	31
Aux. Transformer	85	5	4	4300	31
Rotary Coal Car Dumper	73	50	1	5700	32
Stacker-Reclaimer	75	50	1	6000	33

Total plant noise level projected to nearest residence = 44 dB(A)

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[a] Per Ebasco specifications and vendor information

[b] Monitoring Station 3, Figure 4.6-2.

4.6.2.3 Alternative 1

Noise from the operation of NGS Units 1 and 3 and a RFPP in Duval County at the Jacksonville City Landfill will differ little from the noise levels presently produced at NGS and the Landfill. The two facilities will not employ enough additional personnel to increase traffic-induced noise in the area. Delivery of COM by truck from Blount Island will increase existing noise levels by approximately 0.5 dBA on Heckscher Drive.

Implementation of Alternative 1 will have no impact on the Sanford Plant area.

4.6.2.4 Alternative 2

Study Area 1 will experience the same effects from this alternative as from the No Action Alternative. Operation of the coal-fired boilers at the Sanford Plant will not increase noise levels in Study Area 2. However, an increase in noise will result from the coal handling operations and increased rail traffic. It is anticipated that this noise impact could be largely controlled by appropriate mitigative measures.

4.6.2.5 Alternative 3

The effect of Alternative 3 on Study Area 1 will be increased noise resulting from the operation of a 280 MW coal-fired powerplant. The noise increase for operation of the powerplant should be greater than that attributed to the refuse-fired powerplant of Alternative 1, but less than that attributed to the proposed SJRPP. This should not result in a significant impact on nearby sensitive receptors.

4.6.2.6 Alternative 4

Increased operating noise levels at NGS will occur primarily from coal and ash handling operations. Little additional noise will result from the actual operation of the converted boiler at NGS and no impacts to noise sensitive receptors are predicted.

4.6.3 Comparison of Impacts

The relative noise impacts of each alterantive cannot be quantitatively addressed since specific noise levels for the alternatives (except SJRPP) and the locations of the refuse fired powerplants are not known. Some acoustical comparisons can, however, be made related to the SJRPP/NGS study area, the Sanford study area, and the other areas which might be affected by noise from one of the alternatives. No significant traffic-related noise increases are predicted as a result of the operation of any of the alternatives or the SJRPP.

The SJRPP/NGS study area is compatible, from a noise standpoint, for development of any of the alternatives due to the existing sparsely spaced noise sensitive receptors and the industrial zoning of the area. It is unlikely that any noise sensitive development will occur within the area that would be adversely affected by noise from any of the alternatives.

The Sanford area is somewhat less noise compatible than the SJRPP/NGS study area because several residences are now located near the existing facility and zoning in the area does not indicate that future development will be industrial. There exists a potential for noise impacts associated with Alternatives 2, 3, and 4 due to the addition of coal handling facilities and, for the NSPS alternatives, the additional waste handling facilities required. Plant operational noise levels should remain approximately the same as at present. There also exists the potential for future noise impacts associated with possible residential development near the Sanford Plant.

The location of the refuse-fired powerplants will have a significant effect on the relative impacts of Alternative 1. The proximity of these facilities to noise sensitive receptors would determine the magnitude of the impacts from Alternative 1. It should be noted, however, that these facilities would be located adjacent to existing landfills which is significant for two reasons. First, landfills are noise producers themselves which would mask the effects of a new facility. Second, landfills are generally located in sparsely populated or industrial areas.

Basically, with the exception of the refuse-fired powerplants, none of the alternatives should cause a significant noise increase over existing conditions. The location of the refuse-fired powerplants would determine whether or not noise impacts would occur from Alternative 1.

4.7 AQUATIC AND TERRESTRIAL ECOLOGY

This section summarizes the potential impacts of the proposed project (SJRPP) and the four additional alternatives on biological resources. A detailed analysis of biological impacts which could result from construction and operation of the SJRPP and each of the alternatives is presented in Appendix O. Under the No Action Alternative, no changes in existing biological communities are expected. Consequently, no further discussion of the No Action Alternative is provided.

4.7.1 Construction Impacts

This section summarizes the potential construction-related impacts that could result from the proposed project (SJRPP) and the four alternatives. Included are discussions of the potential effects of elimination of terrestrial habitats, disturbance of aquatic communities, and disturbance of habitat of rare, threatened, or endangered species.

4.7.1.1 Proposed Project (SJRPP)

SJRPP Site - Terrestrial Communities

Clearing of the main site would result in elimination of several hundred acres of terrestrial vegetation. A total of 84.3 acres of seasonally flooded wetland habitat would be eliminated. This includes 1.5 acres of bottomland hardwood, 32.6 acres of cypress swamp, 22.7 acres of bayhead, and 27.5 acres of hardwood swamp (Table 4.7-1). These areas are classified as wetlands according to criteria developed by USFWS (Cowardin et al. 1979). Wetland communities on the site play an important role in detrital production, flood prevention, filtering pollutants originating in upland areas, providing valu-

Table 4.7-1. Areal summary of vegetation community types affected by development of the proposed plant site (JEA/FP&L 1981a).

Vegetation Community Type	Facility Component (Acres)					Total Area Affected	Total Area Within Site (Ac)	Total Area Not Affected (Ac)	Percent of Total Area On-Site Affected*
	Plant Island and Rail Loop	Bottom Ash Disposal Area	Solid Waste Disposal Area A	Solid Waste Disposal Area B	Access Road				
Bottomland Hardwood	0.0	0.0	0.0	0.0	1.5	1.5	79.9	78.4	1.8
Cypress Swamp	7.3	0.0	3.3	22.0	0.0	32.6	40.1	7.5	81.2
Grassy Scrub/Pine Flatwood	158.4	128.2	0.0	0.0	0.0	286.6	363.2	76.6	78.9
Bayhead	21.1	1.6	0.0	0.0	0.0	22.7	28.3	5.6	80.2
Hardwood Hammock	61.3	1.5	79.4	0.0	1.4	143.6	415.2	271.6	34.6
Hardwood Swamp	27.5	0.0	0.0	0.0	0.0	27.5	100.8	73.3	27.3
Pine Flatwoods	10.6	8.9	5.1	325.5	3.8	363.9	504.1	150.2	70.2
Salt Marsh	0.0	0.0	0.0	0.0	0.0	0.0	41.1	41.1	0.0
Grassy Scrub	0.0	0.0	0.0	0.0	0.0	0.0	24.5	24.5	0.0
Open	14.1	0.0	0.0	0.0	0.0	14.1	58.7	44.6	24.0
Total	300.3	140.2	87.8	347.5	6.7	882.5	1655.9	778.6	53.0

* Total area of each vegetation type within site boundaries

able food and habitat for wildlife, and helping to maintain the ecological balance of the St. Johns River estuary (Section 3.5). Their elimination constitutes an adverse impact and a permanent commitment of irretrievable resources.

Approximately 364 acres of pine flatwoods on the main site will be eliminated during construction. Pine flatwoods on the site have been previously disturbed and are not highly diverse or productive with respect to wildlife. Pine flatwoods are also very common in the study area. However, pine flatwoods are important as habitat for the gopher tortoise and several other associated rare or threatened species which are commensal with the tortoises. Pine flatwood areas also provide excellent quail habitat (Section 3.5). Adverse impacts on these species would occur as a result of clearing operations.

SJRPP Site - Aquatic Communities

Aquatic habitats within seasonally flooded wetlands on the main site at the SJRPP would be directly eliminated during site preparation. These aquatic habitats: (1) release nutrients to adjacent salt marsh and estuarine areas; (2) assimilate and filter various pollutants; and (3) are important to species with short life cycles. Nevertheless, aquatic species which inhabit these areas are important ecological components of terrestrial ecosystems in the area.

Estuarine areas adjacent to the main site provide valuable feeding and nursery grounds for numerous finfish and invertebrates, many of which are of commercial and recreational importance. Any construction related effects due to erosion runoff or drainage alterations which would occur if appropriate mitigative measures are not strictly adhered to would result in adverse impacts on these highly sensitive nursery and spawning areas.

During the six year plant construction phase, effluent from the sanitary waste treatment plant as well as plant runoff will be discharged through the runoff sediment control pond into a headwater area of Browns Creek marsh (Section 4.3). Browns Creek in the vicinity of the discharge is a sensitive nursery, spawning, and feeding area for many commercial and recreationally important fish and invertebrates (Section 3.3). The discharge to Browns Creek marsh will meet State and Federal water quality standards. However, potential adverse impacts on this area could result from introduction of slightly elevated levels of chlorine, suspended solids, nutrients, and trace metals. Possible impacts could include toxic effects on more sensitive larval forms and food organisms of commercially important species, increased occurrence of algal blooms, and increased potential stress on resident fish and invertebrate populations.

SJRPP Site - Rare, Threatened, and Endangered Species

Construction activities could have several potential impacts on protected species which inhabit the site or occur in the vicinity of the SJRPP. These impacts include the following:

- Some alligator habitat will be lost due to elimination of freshwater wetlands (hardwood swamps) on the site;

- Loss of 364 acres of pine flatwood on the main site would eliminate habitat of the gopher tortoise and associated rare species which inhabit its burrows;

- The presence of the gopher frog and eastern indigo snake on the site was not determined, but these species (often associated with gopher tortoise burrows) would be eliminated if they occur on the site;

- Southern bald eagles which might rest or winter in the slash pines on the border of the site would avoid the area during construction and possibly in the future;

- Arctic peregrine falcons and southeastern kestrels which migrate through the area each year or which winter in the area would avoid the site during construction and possibly in the future;

- Nesting and/or feeding wood storks which are known to nest near the site could be disturbed during construction and possibly in the future;

- Red-cockaded woodpeckers and Florida scrub jays, both of which may have previously foraged on or near the site, would avoid the area during construction and in the future;

- Nesting of several "species of special concern" which may utilize the rookery at the edge of the site including the great and little blue herons, snowy egret, reddish egret, and Louisiana heron would be disturbed if construction occurs during breeding seasons; and

- Eastern brown pelicans and ospreys would probably avoid the area during construction and possibly in the future.

- The existing populations of spoonflowers occurring in the bayhead area would be eliminated.

These potential impacts would be minimized to some extent by establishment of the proposed 200 foot buffer zone around the edge of the site. This would help reduce noise and visual effects on the above species. However, the proximity of the site to habitats of such a large number of rare, threatened, or endangered species would probably result in construction-related impacts.

SJRPP - Blount Island Coal Unloading Facility

Construction of the coal unloading facility would eliminate approximately 86 acres of sea myrtle and grassy shrub habitats. These are considered to provide only minimal wildlife habitat. Less than one acre of salt marsh and a small area of mixed hardwoods on Blount Island would also be eliminated. The entire area has been previously disturbed, however.

Benthic invertebrate populations would be eliminated during dredging operations required to construct the coal unloading facility. However, these areas would rapidly recolonize and no long-term impacts on benthic organisms are projected. Dredging may in some cases cause the release of various trace metals or other toxic materials which could be detrimental to terrestrial and aquatic organisms (USCOE 1976). Any materials which might possibly be released would be rapidly removed from the water column by flocculation with ferric hydroxide colloidal gels (Windom 1972; USCOE 1976). Such gels are abundant in estuarine waters of the study area. Therefore, no long-term changes in the water quality of the St. Johns River estuary are projected to result from dredging and only short-term effects on aquatic organisms would occur.

Dredging would occur between late fall and early winter in order to minimize potential impacts on ichthyoplankton, benthic organisms, and fish. All dredged material will be disposed of in diked areas approved by the USCOE (JEA/FP&L 1981a). No adverse long-term impacts due to dredging activities are projected.

Spoil disposal on Blount Island would temporarily interrupt least tern nesting activities in the area. When current and future JEA spoil disposal activities are completed, least terns could resume nesting in the area provided that the quality of the dredged material is not deleterious to this species.

SJRPP - Transmission Corridor

A total of 4.92 miles (120 acres) of terrestrial plant communities would be disturbed along the existing corridor (JEA/FP&L 1981a). The preferred corridors to JEA's Robinwood and Normandy Substations include wooded wetlands (largely drained) with very little salt marsh. Thus, ROW alignment would have little effect on corridor wetlands as a whole. However, assuming that the new line will be adjacent to the existing ROW, some additional clearing (less than 150 feet) would be required through an undisturbed cypress wetland near Normandy Substation (Figure 3.5-3).

With proper care, salt marshes would not be greatly impacted by transmission line construction. The applicant has stated that mats will be used to support heavy equipment in the marsh, thereby preventing lasting damage to marsh areas. If towers must be located in a marsh, the habitat would be disturbed only in the immediate tower foundation areas.

Some upland plant communities along the existing ROW will be eliminated. Cleared forested areas would be replaced by earlier stages of ecological succession. No major forest stands would be eliminated in ROW preparation and no chemical herbicides and pesticides will be used (JEA/FP&L 1981a).

On Blount Island, spoil areas on and near the existing ROW have the potential to provide nesting habitat for several species of shorebirds as well as least terns. If construction takes place during the breeding season (April-August), these birds may be driven away from nesting areas. The osprey has nested in towers on Blount Island and in the salt marsh near the NGS. Construction in the areas of nesting terns and ospreys will be avoided (JEA/FP&L 1981a). Fresh spoil mounds left behind or introduced to the area may expand potential nesting habitat for the terns if the dredged material is not toxic.

Tower construction in Mill Cove and the area east of the existing line would require dredging or draglining. This activity would result in temporary increases in turbidity and cause fish and other nekton to avoid the area. Benthic invertebrates would also be temporarily eliminated in the dredged area.

4.7.1.2 Construction-Related Impacts of the Alternatives

Alternative 1

Alternative 1 would require elimination of 39 acres of pine flatwood habitat at the NGS site, but this habitat has been previously disturbed. A total of 7 acres of habitat of unknown type in Seminole County and a total of 36 acres of unknown habitat would be eliminated in other portions of the FP&L service area for construction of refuse-fired power plants under this alternative. However, this alternative would result in avoidance of the elimination of 265 acres of habitat in Duval County for a landfill since the plant would dispose of this refuse. Elimination of an additional 275 acres of terrestrial habitat in all other areas of the FP&L service area will be avoided since the refuse-fired power plants in Seminole, Sarasota, Manatee, and Brevard Counties will dispose of those materials which would have been landfilled. This alternative would also disturb 150 miles of terrestrial communities along the Georgia Power intertie transmission line ROW (about 3,640 acres). It is assumed that these disturbances will be minimized by proper tower alignment and vegetation management techniques.

Alternative 2

Alternative 2 would also require a 150 mile long transmission line ROW and therefore would result in disturbances identical to Alternative 1. This alternative would also result in the elimination of 89 to 195 acres of land immediately to the north of the Sanford site for solid waste disposal. These areas are considered to be previously disturbed or of relatively moderate quality as wildlife habitat. However, some of the more continuous pine flatwood areas could harbor gopher tortoises, gopher frogs, and indigo snakes. Elimination of these habitats could constitute an adverse impact. Nine small wetlands (apparently located primarily in open farm or pastureland areas) of unknown type also would be eliminated (Appendix O).

Alternative 3

Impacts at the Sanford Plant under this alternative would be identical to those under Alternative 2. Construction of the 280 MW plant at the SJRPP site would reduce habitat destruction by 50 to 75% in comparison with the proposed project. Reorientation of the rail loop and use of solid waste disposal area B would reduce potential impacts on valuable wetland areas and endangered species habitats.

Alternative 4

Under this alternative, coal conversion of the NGS Unit 3 to coal would result in elimination of 59 to 127 acres of additional upland habitat just to the north of the plant on the site for solid waste disposal. Impacts in the Sanford area and other areas of the FP&L system would be identical to those under Alternative 3.

4.7.1.3 Comparison of Construction-Related Impacts

Alternatives 1 and 2 would result in a large amount of habitat disturbance along the 150 mile long transmission line ROW. In this respect, they differ significantly from all other alternatives and the proposed project. If ROW's are aligned with care and properly managed, however, they could be made into productive wildlife habitats. In this case, Alternatives 1 and 2 would result in a lower amount of habitat loss.

The terrestrial habitats at the Sanford Plant appear to be of relatively low value to wildlife and consist largely of cleared areas. No adverse impacts to wildlife under the coal conversion feature would occur under Alternatives 2, 3, and 4. However, areas in the vicnity of the Sanford Plant could harbor certain protected species. The existence of these species would have to be confirmed prior to beginning construction at the Sanford site. In addition, several wetland areas of unknown characteristics would be eliminated. Alternative 3 would reduce the total amount of habitat disturbed at the SJRPP by 50 to 75% in comparison with the proposed project. Valuable wetland areas and protected species could still be affected by runoff, however.

In conclusion, the proposed project would result in the most significant construction impacts because relatively greater amounts of wetlands, upland habitat, and protected species habitat would be eliminated. All of the other alternatives would result in reduced construction-related impacts on biological resources.

4.7.2 Operation Impacts

This section describes the potential operation-related impacts which could result from the proposed project (SJRPP) and the four alternatives. Included are discussions of the potential effects of wastewater discharges, solid waste disposal, air emissions, and transmission facilities on biological resources.

4.7.2.1 Proposed Project (SJRPP)

Wastewater Discharge Impacts

The SJRPP will increase the total amounts of trace metals entering the River by a small amount and will produce elevated levels of these pollutants at the point of discharge and within the mixing zone. Since the St. Johns River in the vicinity of the SJRPP is already stressed by elevated levels of trace metals and other pollutants, there is a potential for adverse impacts to result from the discharge.

The SJRPP will cause levels of mercury at the point of discharge (POD) to approach the acute toxicity level for embryos of the American oyster under worst case conditions (Tables 4.7-2 and 4.7-3). Levels of copper at the POD would exceed acute toxicity levels calculated based on reported 96-hour LC_{50} data for the planktonic stage of *Capitella capitata*, an indigenous species of polychaete worm. Predicted concentrations for cyanide under average conditions will not exceed the calculated acute toxicity level for any known significant indigenous species. However, the maximum predicted concentration for cyanide would exceed the calculated acute toxicity level at all locations under maximum predicted concentrations.

Table 4.7-2. Comparison of predicted aluminum, iron, copper, cyanide, mercury, and silver concentrations in the Blount Island Channel during proposed plant operation to toxicity levels reported for significant indigenous species of the Blount Island Channel (JEA/FP&L 1981a)*.

	Ambient Concentration[a]		Class III	Estimated POD Concentration[a]		Estimated Concentration at Edge of 31 Acre Mixing Zone[e]		Toxicity Levels for Significant Indigenous Species[f]		
Parameter	Avg	Max	Standard[b]	Avg[c]	Max[d]	Avg[c]	Max[d]	96 hrLC$_{50}$[g]	Acute[h]	Chronic[i]
Cyanide (mg/l)	<0.01	0.09	0.005	0.01	0.099	l	0.09	0.05-0.07	0.016-0.022	j
Iron (mg/l)	0.08	2.7	0.30	0.83	3.0	l	2.73	25	8.5	1.3
Silver (µg/l)	0.16	0.35	0.05	0.21	0.54	0.165	0.37	~5.8[k]	~1.9	~0.3
Copper (µg/l)	69.0	275.0	15.0	73.0	344.0	71.0	283.0	80.0	27.0	j
Aluminum (mg/l)	0.49	3.63	1.5	0.5	4.41	l	3.66	8.9-17.8	3.0-5.9	j
Mercury (µg/l)	0.24	0.6	0.1	0.56	1.67	0.27	0.70	~5.6[k]	~1.9	~0.28

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a See Table 5.1-9 (JEA/FP&L 1981a).
b See Table 2.5-1 (JEA/FP&L 1981a).
c Footnote b, Table 5.1-9 (JEA/FP&L 1981a).
d Footnote c, Table 5.1-9 (JEA/FP&L 1981a).
e See Appendix C, Section C.6 (JEA/FP&L 1981) for estimated concentrations. As discussed in Section 5.1.1, Section 17-4.244(1)(g), FAC, allows maximum chemical mixing zones of 125,600 square meters (31 acres) for estuaries.
f Significant indigenous species is defined as an important species of the Blount Island Channel as determined through recent studies including the preoperational monitoring program (Table 2.2-2).
g The concentration of the pollutent lethal to 50 percent of the test organisms in 96 hours (96 hrLC$_{50}$) where the 96 hrLC$_{50}$ is the lowest value which has been determined for a species significant to the indigenous aquatic community, i.e., Blount Island Channel; or may reasonably be expected, based upon evaluation by generally accepted scientific methods, to produce effects equal to those of the concentration of the substance specified above.
h Defined as one-third of the 96 hrLC$_{50}$.
i Defined as one-twentieth of the 96 hrLC$_{50}$.
j Concentration below Class III standard.
k 48 hrLC$_{50}$.
l Less than or equal to ambient levels.
* Ambient concentrations based on JEA/FP&L, 1981a, Water and Waste Management Study, St. Johns River Power Park, Units 1 & 2, 1985-1987, August 1981. 45 p.

Table 4.7-3. Indicator species and sensitivities used in computing acute and chronic toxicity concentrations for cyanide, iron, silver, copper, aluminum, and mercury (JEA/FP&L 1981a)[a].

Parameter	Indicator Species	Reported 96 hrLC$_{50}$ Concentration	Reason for Selection
Cyanide	Pinfish *Lagodon rhomboides*	0.048-0.066 mg/l HCN as CN (Daugherty and Garrett, 1951)	Significant Indigenous Species[b]
Iron	Mosquitofish *Gambusia affinis*	25 mg/l $FeCl_3$ as Fe (Wallen *et al.*, 1957)	Substitute for Significant Indigenous Species[c]
Silver	American oyster-embryo[d] *Crassostrea virginica*	5.8 ug/l $AgNO_3$ as Ag[e] (Calabrese *et al.*, 1973)	Significant Indigenous Species[f]
Copper	Polychaete worm - trochophore[d] *Capitella capitata*	80 ug/l $CuSO_4$ as Cu (Reish and Martin, 1976)	Significant Indigenous Species[f]
Aluminum	White shrimp *Penaeus setiferus*	8.9-17.8 mg/l $AlCl_3$ as Al[g] (Pulley, 1950)	Significant Indigenous Species[f]
Mercury	American oyster-embryo[d] *Crassostrea virginica*	5.6 ug/l $HgCl_2$ as Hg[e] (Calabrese *et al.*, 1973)	Significant Indigenous Species[f]

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[a] For a comparative summary of toxicities for other significant indigenous species, refer to Appendix B, Tables B-22 through B-27.

[b] Only significant indigenous species reported in the available literature.

[c] There was no report of iron toxicity for a significant indigenous species; therefore, the mosquitofish was used since it occurs in the tidal creeks of the study area and may reasonably be expected to produce effects equal to those of significant indigenous species, i.e., those that commonly occur in Blount Island Channel.

[d] Planktonic stage.

[e] Based on the 48 hrLC$_{50}$ since 96 hrLC$_{50}$ was not reported; concentration of pollutant for 96 hrLC$_{50}$ expected to be slightly lower than at the 48 hrLC$_{50}$.

[f] Most sensitive of several significant indigenous species reported in the available literature.

[g] Three other signifiant indigenous species of nekton within this toxicity range include red drum (*Sciaenops ocellata*), spotted seatrout (*Cynoscion nebulosus*), and striped mullet (*Mugil cephalus*).

The average mixing zone and POD levels of cyanide, iron, silver, and aluminum should be less than the calculated chronic toxicity levels for significant indigenous species. Copper and mercury would exceed or equal the calculated chronic toxicity levels. Maximum ambient and consequently maximum predicted POD and mixing zone concentrations of cyanide, aluminum, copper, iron, mercury, and silver would exceed the calculated chronic toxicity levels.

Maximum values of cyanide, mercury, and copper are estimated to exceed the 96-hour LC_{50} concentration at the POD for indigenous species. Section 17-4.222(4), FAC, prohibits a mixing zone from containing maximum concentrations exceeding the 96-hour LC_{50} for a species significant to the aquatic community.

In conclusion, based on acute toxicity levels, potentially adverse conditions due to ambient concentrations of cyanide, copper, and mercury (and possibly other metals) could therefore exist in Blount Island Channel at the POD and within the mixing zone. This would place additional stress on existing populations of estuarine organisms in the St. Johns River. For copper and mercury, food web biomagnification could result. This is judged to constitute a potentially major adverse ecological impact.

An additional source of trace metals may potentially be derived from coal pile runoff at the Blount Island facility. The coal piles on Blount Island will be lined, but some trace elements will reach the estuary via the percolation pond which will collect the coal pile runoff (Section 4.3). Eventually, some of these materials will enter the St. Johns River even though coal pile runoff entering the percolation pond will be pretreated. This can only act to degrade the quality of aquatic life in the estuary.

Impacts of Plant Water Use

Increased cooling water requirements would have certain impacts on existing impingement and entrainment patterns at NGS. Increased impacts of thermal plumes and chlorine (used as an algal suppressant in cooling towers) are expected to be negligible (Appendix O).

No increased impingement would result from the proposed SJRPP during combined operation with the NGS since flows and velocities at the NGS intake would not change (JEA/FP&L 1981a). When the SJRPP is operating alone, it will maintain a flow of 98,000 gpm. This would result in impingement of approximately 125,000 fish, 41,000 commercial shrimp, and 17,000 blue crabs per year (Rehm et al. 1975; JEA/FP&L 1981a). Most impinged nekton would be returned to San Carlos Creek via the fish return system currently being used at NGS. However, the reliability and efficiency of this system have not yet been fully demonstrated (Appendix O) and are currently under study by the JEA. The system was not operational during the USEPA site visit (24 June 1981). Until more is known concerning the actual effectiveness of the fish return system, impacts of impingement at SJRPP cannot be adequately addressed.

No increase in the total number of entrained zooplankton or ichthyoplankton would occur as a result of the combined operation of the SJRPP and NGS (Appendix O). However, the SJRPP would require a maximum of 14% of the total volume of water used at NGS. This would result in a very small increase in mortalities of living organisms which survive passage through the NGS. When the SJRPP operates alone, entrainment mortalities would drop significantly. In conclusion, because no additional cooling water would be withdrawn from the St. Johns River for the SJRPP, it will have no significant adverse impacts on the entrainment and subsequent mortality of planktonic organisms (Appendix O).

Solid Waste Disposal Impacts

A significant impact on wetlands adjacent to the site could result from seepage of contaminants from solid waste disposal areas. Waste disposal areas will be designed to minimize seepage by use of liners with permeabilities of 9×10^{-4} cm/sec or less and other techniques (JEA/FP&L 1981a). However, a certain amount of seepage will still occur (for fly ash or gypsum storage areas seepage rates of 500 to 1,000 gallons per day per acre are possible) (JEA/FP&L 1981a). Since seepage will contain certain (and unknown) amounts of trace elements, there is a potential for contamination of food chains in the adjacent Browns Creek and Clapboard Creek marshes (Section 4.3). These sensitive wetland areas provide habitat for many State and Federally listed rare, threatened, or endangered species and also are nursery, spawning, and feeding areas for numerous commercially important fish and invertebrates (Section 3.5).

Air Emission Impacts

Terrestrial Vegetation. An analysis of potential impacts of SO_2, NO_2, and O_3 separately and acting synergistically on terrestrial vegetation was provided by the applicants (JEA/FP&L 1981a). Responses of terrestrial vegetation in the vicinity of the SJRPP were also analyzed (JEA/FP&L 1981a). The following conclusions were made with regard to the potential significant negative effects of these emissions on terrestrial vegetation:

- Under worst-case conditions and in the area of maximum concentration some sulfur dioxide injuries could occur to maples, southern pines, sumac, blackberries, sweetgum, and cherries (However, occurrence of worst-case conditons would be rare);
- Maximum predicted ground level concentrations of nitrogen dioxide were well below threshold values of sensitive species except for alfalfa (which is not grown in the vicinity of the site); and
- Existing ambient levels of ozone in the study area (294 ug/m^3) are within the range of threshold concentrations reported to be injurious to vegetation, but it is difficult to predict the actual impacts due to the lack of knowledge concerning ozone effects;
- Under worst-case conditions, some injury to area vegetation may result from SO_2/O_3 synergism, but the occurrence of worst-case conditions would be highly infrequent.

Some impacts due to gaseous emissions may occur due to operation of the SJRPP, but these would occur only under worst-case conditions. The worst-case conditions would occur infrequently, however.

An analysis of the potential effects resulting from the emission of 18 trace elements on surrounding vegetation was also conducted (JEA/FP&L 1981a). Predicted deposition rates were calculated for each element and the potential impacts on plant life in the area due to elevated levels of trace metals in the soil were determined by comparison to known threshold toxicities. A detailed analysis showed that levels of these metals in soils would not result in any significant adverse effects on surrounding vegetation.

Fugitive dust emissions from coal storage piles and loading facilities will be controlled by wet spraying, dry dust collection, and enclosed conveyors. This will reduce fugitive emissions by over 90% (JEA/FP&L 1981a). Fugitive dust emissions will therefore be highly localized and will not be significant.

An analysis of the potential effects of cooling tower drift on vegetation was conducted in which predicted salt deposition rates were compared to natural rates of deposition and to known chloride and sulfate injury thresholds. The following is a summary of the conclusions of this analysis:

- The natural rate of sea salt deposition was estimated to be 0.41 $mg/m^2/hr$ based on data from New Jersey. The SJRPP was estimated to produce an additional 0.9 $mg/m^2/hr$.

- Natural background rates of chloride deposition were estimated to be 0.23 $mg/m^2/hr$; the SJRPP would produce an additional 0.28 $mg/m^2/hr$.

- Natural background rates of sulfate deposition were estimated to be 0.42 mg $SO_4/m^2/hr$; the SJRPP would add 0.035 mg $SO_4/m^2/hr$ to this figure.

From these results and a review of the literature, it was concluded that salt deposited from the cooling towers would have no significant effect on natural vegetation or crops within the immediate vicinity or the region of the proposed plant with the possible exception of flowering dogwood (Cornus florida). The chloride injury threshold for flowering dogwood is reported to range from 0.561 mg $Cl/m^2/hr$ (1.02 mg $salt/m^2/hr$) (Curtis et al. 1978) to 16.67 mg $Cl/m^2/hr$ (Silberman and McCune 1978). Flowering dogwood is the only naturally occurring species found within the immediate vicinity of the proposed plant with a reported chloride injury threshold. On the basis of the reported injury threshold and the predicted maximum seasonal average deposition rate of 0.51 mg $Cl/m^2/hr$, it is possible that some injury could occur to flowering dogwood if located within the area of maximum off-site deposition (JEA/FP&L 1981a).

There is also some concern regarding deposition of cooling tower salts on pasture grasses at the nearby M&M dairy farm. A study by Schroeder (1966) showed that Pensacola bahia grass is sensitive to elevated levels of salt. However, since the area in question already receives approximately 32.7 pounds of salt/acre/year, it is doubtful that the small increases in salt deposition produced by the SJRPP would cause adverse impacts on bahia grass.

Terrestrial Wildlife. Levels of SO_2 and NO_2 predicted to occur in the vicinity of the SJRPP are well below those reported to cause acute or chronic injury to terrestrial wildlife. Wildlife and livestock would also be exposed to trace element emissions from the proposed plant. However, recent studies (Dvorak et al. 1978) have shown that if tall stacks are used and if the NSPS limits are met, no adverse impacts on livestock and wildlife due to trace metal emissions should occur. No studies were located during the course of completion of this EIS which addressed effects of trace element emissions from coal-fired plants on dairy cows or cow milk. It is unlikely that adverse effects would occur due to the use of taller stacks, the dispersion characteristics of the plume, and emission characteristics at the SJRPP. However, such effects cannot be accurately assessed at this time due to the lack of available information.

Some fugitive dust would be emitted from coal storage areas, but this will be controlled by appropriate mitigative techniques. Only highly localized effects on wildlife would therefore result from these emissions.

Cooling towers and facility stacks are tall enough to obstruct birds migrating along the Atlantic Flyway and some mortalities would occur. However, the number of mortalities would be extremely small relative to the total populations in the area. Cooling tower drift will deposit increasing amounts of salt on surrounding farming areas. Dairy cows and livestock in the area around the plant should not be affected by these emissions, however, since the maximum amount of salt deposited will amount to only about 0.2 $mg/m^2/hr$ (15.6 lbs/acre/year). The State of Maryland Power Plant Siting Act recommends 100 lbs of salt/acre/year as a cautionary limit for agricultural areas. The natural rate of deposition at the SJRPP was estimated to be 0.42 $mg/m^2/hr$ (32.7 lbs/acre/year) (JEA/FP&L 1981a). Therefore, the proposed plant would not cause the cautionary limit to be approached or exceeded. This would be true even under worst-case conditions at the edge of the site boundary (Appendix O).

Aquatic Habitats. The most significant potential impacts of stack emissions on aquatic life are related to acid rain. The pH levels in Florida lakes, primarily those in the northern part of the State, have been dropping (e.g., becoming more acidic) over the past two decades. Many of Florida's perched sand lakes have little or no buffering capacity and are therefore very susceptible to acid rain. As noted by the Florida Game and Fresh Water Fish Commission (GFWFC), such areas exist 30 miles to the west of the proposed plant. The extreme western portion of Nassau County, most of Baker and Columbia Counties, the western half of Clay County, the eastern half of Bradford County, and parts of Georgia are characterized by surface waters of pH 4.0-5.0 (Appendix H).

The proposed plant has some potential for further reducing the pH of the surface waters in these areas because of acid precipitation. The assessment by the Florida GFWFC was a subjective determination based on the amounts of sulfur and nitrogen oxides to be produced, the prevailing wind direction, and the proximity of the areas of concern (Appendix H). However, it is extremely difficult to attribute acid rain impacts to any particular point source (Dvorak et al. 1978). Therefore, these assertions cannot be proven until further studies are conducted in the specific geographic areas in question. The most objective assessement at this time would be to conclude that an unknown potential exists for such effects to occur.

Coal spillage at the dock area and fugitive coal dust emissions could result in coal particles entering the St. Johns River. Potentially toxic effects on aquatic organisms could occur since coal contains various amounts of sulfides, hydrocarbons, and trace elements (Torrey 1978). However, little is known about the factors which control the fate of coal dust in estuaries. It is therefore difficult to accurately assess the long-term impacts of coal dust from the proposed facility on aquatic life in the area. The potential for long-term buildup of coal dust within the estuary exists. However, the small amount of coal dust emitted would be greatly diluted over a large area.

4.7.2.2 Operation-Related Impacts of the Alternatives

This section describes the potential biological impacts which could result from the implementation of Alternatives 1 through 4. The discussion is based on a more detailed analysis presented in Appendix O. The reader is referred to Sections 4.2 and 4.3 of the EIS for data concerning the air and water pollutant loadings on which the assessment of biological impacts is based.

Alternative 1

Alternative 1 would result in only very small increases in loadings of oil, grease, and trace metals to the St. Johns River estuary near Jacksonville (less than 1% of the increase caused by the proposed project). These increases would probably not greatly affect existing aquatic communities although any increase in toxic materials would produce added stress on aquatic life in the area. This alternative does not involve the Sanford Plant and its waste discharges would not change. Pollutant loadings to surface waters could be expected to decrease at some other existing generating stations in the FP&L service area due to oil displacement. However, new discharges would occur at the various refuse-fired plants. Greater impacts could occur at new generating locations, but a slight improvement in overall conditions for aquatic life in the FP&L system would result.

Net increases in emissions of SO_2 in the Jacksonville area under this alternative would be 9.5 times greater than the increases caused by the proposed project (Section 4.2). This could result in SO_2 injury to surrounding vegetation at the NGS and at the Jacksonville North Landfill under worst-case conditions. Increased HCl emissions from the refuse plant could have a similar effect in the vicinity of the landfill. No air-related biological impacts are projected in the Sanford area and only localized impacts are projected in other parts of the FP&L service area due to operation of the other refuse plants.

Alternative 2

Wastewater discharges under this alternative would have little effect on aquatic life in the St. Johns River near Jacksonville. However, increased pollutant discharges potentially could further degrade aquatic life in the eutrophic waters of the St. Johns River near the Sanford Plant. No effects of wastewater on aquatic life would result in other parts of the FP&L service area.

Decreases in air emissions under this alternative due to displacement of oil-fired power generation may benefit terrestrial communities in the Jacksonville area. However, major increases in air emissions in the Sanford area for the SIP case could have negative biological impacts on the terrestrial community. The large reduction in SO_2 emissions at Sanford for the NSPS case would improve conditions for the biological community. Reductions in net emissions in other areas of the FP&L system could benefit biological communities.

Alternative 3

The 280 MW coal-fired plant at the SJRPP site would reduce additional pollutant loads to the St. Johns River estuary as compared to the proposed project (Section 4.2). This would be an improvement over the SJRPP, but would still potentially place increased stress on existing aquatic populations due to the elevated levels of pollutants. Wastewater impacts on aquatic life in the Sanford area would be the same as in Alternative 2 under this alternative. Alternative 3 would have no effect on aquatic life in other portions of the FP&L system.

Net emissions in the Jacksonville area would decrease due to the purchase of power, but would increase at the SJRPP site due to operation of the small coal-fired plant. However, the emissions of the small coal-fired plant would be only about 25% of those predicted for the proposed project. This could result in lower potential for SO_2 and NO_2 injury to terrestrial vegetation in comparison with the proposed project. Under NSPS, biological impacts due to SO_2 emissions at Sanford could be reduced; under SIP limits, they would potentially increase. Decreased emissions in other portions of the FP&L system could benefit biological communities in these areas.

Alternative 4

A net increase in loadings of most pollutants would occur in the St. Johns River near Jacksonville under this alternative. This increase would further degrade the existing water quality and place additional stress on aquatic organisms in the estuary. The impacts of Alternative 4 on aquatic resources within the FP&L service area would be the same as described under Alternatives 2 and 3.

If NSPS limitations are applied to the NGS Unit 3 and Sanford Units 4 and 5 coal conversion, the large reduction in SO_2 emissions would benefit the surrounding biological communities. For the SIP case, substantial increases in emissions with associated biological impacts would occur in the vicinity of both NGS and Sanford. However, a noticeable benefit to the Jacksonville area would still result due to the emissions displaced by purchase of power.

4.7.2.3 Comparison of Impacts

Wastewater Discharges

Alternatives 1 and 2 would produce the fewest wastewater discharge effects on aquatic life in the St. Johns River in the Jacksonville area. The proposed project would produce the largest net increase in pollutants (other than chlorine) and would have the greatest effect on aquatic life in a system that is already stressed by poor water quality. Alternatives 3 and 4 would both have adverse impacts on aquatic life in the St. Johns River estuary near Jacksonville due to overall increases in pollutant loadings. Alternatives 2, 3, and 4 would contribute to a further decline in the quality of aquatic life in the already eutrophic St. Johns River near the Sanford Plant. Alternative 1 and the proposed project would have no effect on this area. Impacts on aquatic life in other areas of the FP&L system would be relatively minor under any of the alternatives.

Air Emissions

Alternative 2 would have the most beneficial impacts on wildlife and plant communities in the Jacksonville area in the vicinity of the NGS and SJRPP since this alternative would result in a net decrease in all air emissions through purchase of power. However, these benefits are offset by increases in the Sanford area. Alternative 1 would increase air emissions by the greatest amount, and would therefore have the greatest relative biological impacts. Since the proposed project was shown to have potential SO_2 impacts (under worst-case conditions), Alternative 1 may potentially have even greater impacts on vegetation near the SJRPP. Alternative 1 is also unique in causing increased HCl emissions which would potentially have impacts on surrounding biological communities near the SJRPP at the Jacksonville North Landfill (these are not possible to predict accurately without modeling, however). Alternatives 3 and 4 would probably have similar effects on the Jacksonville area plant and animal communities depending on whether NSPS or SIP limits were used.

Due to increased emissions, Alternatives 2, 3, and 4 could have adverse biological impacts in the Sanford area under SIP, but beneficial effects under NSPS. Alternative 1 and the proposed project would have no biological effects on the Sanford area due to air emissions. Only localized air-related impacts on biological resources are projected for other areas of the FP&L system under Alternative 1.

Solid Wastes

The potential impacts of solid wastes for Alternatives 1 through 4 on the biological communities in all areas would be similar since all waste disposal sites will be lined with an impermeable material to prevent seepage. Certain of the solid waste disposal areas for the proposed project, however, will be lined with material of permeabilities of only approximately $9x10^{-4}$ cm/sec (Section 3.4). This constitutes a major difference between the proposed project and the four alternatives. Since the disposal areas for the proposed project are located adjacent to and upgradient of the Brown's Creek and Clapboard Creek marshes, seepage from solid waste could contaminate the food chains in these valuable wetlands (Section 4.7.2.2). This area harbors various State and Federally listed rare, threatened, or endangered species, and is an important nursery feeding and spawning area for commercially important fish and shellfish. Contamination of the food chain could have adverse impacts on these species. These potential impacts would not occur under Alternatives 1 through 4 because all solid waste disposal areas would be lined with impermeable materials.

4.8 IMPACTS ON CULTURAL RESOURCES

The impacts of the proposed project (SJRPP), the No Action Alternative, and the four additional alternatives on historic, cultural, and archaeological resources are evaluated in this section. The comments and recommendations of the Florida SHPO have been used extensively to determine effects and/or impacts on historical and cultural resources in Duval and Volusia Counties. A more detailed analysis of cultural resources impacts which could occur from construction and operation of the SJRPP and the alternatives is presented in Appendix P.

4.8.1 Construction-Related Impacts

4.8.1.1 SJRPP

Construction of the SJRPP would have an adverse effect on archaeological resources which are potentially eligible for listing on the National Register of Historic Places. USEPA has made a formal request for a determination of eligibility from the Keeper of the National Register for a cluster of eleven significant archaeological sites (Figure 4.8-1) known as the St. Johns River Power Park Archaeological District. On 30 September 1981, the Secretary of the Interior determined that the District is eligible for listing on the National Register of Historic Places (Schull 1981). Land modification activities during construction of the SJRPP would destroy portions of the sites in this district. Construction of a runoff sediment pond would destroy site 8Du699. Railroad loop construction would destroy portions of 8Du699 and 8Du634. Site Du677 would be destroyed as the result of land modifications necessary to construct a solid waste disposal landfill. The remaining sites in the district, 8Du670, 8Du673, 8Du675, 8Du678, 8Du674, may be subject to an adverse effect as the result of isolation from or alteration of the property's surrounding environment. In addition, compaction of soils during construction activities may alter or destroy unidentified buried archaeological remains. The locations of the archaeological resources which would be adversely impacted by construction at the SJRPP site are indicated in Figure 4.8-2.

Pursuant to the advisory Council on Historic Preservation's regulations (36 CFR 800), USEPA has consulted with the Florida SHPO and is seeking Advisory Council comments in regard to the identified adverse impact on the archaeological resources at SJRPP. According to the Florida SHPO, the proposed coal unloading facilities on Blound Island are located in an area deemed unlikely to contain significant archaeological or historic site remains (Percy 1981a). Therefore, the construction of facilities on Blount Island would have no effect on cultural resources.

Archaeologically sensitive areas within the proposed transmission line corridor have been identified in Appendix K of the applicants' EID (JEA/FP&L 1981a). The Florida SHPO recommends that once the line right-of-way is selected that those portions of the right-of-way crossing the identified archaeologically sensitive areas be subjected to a systematic archaeological site assessment survey and copies of the resulting reports submitted to FDAHR for review and comment (Percy 1981a).

The site facilities will be visible from two National Register properties, the Fort Caroline National Monument, and the Kingsley Plantation on Ft. George Island.

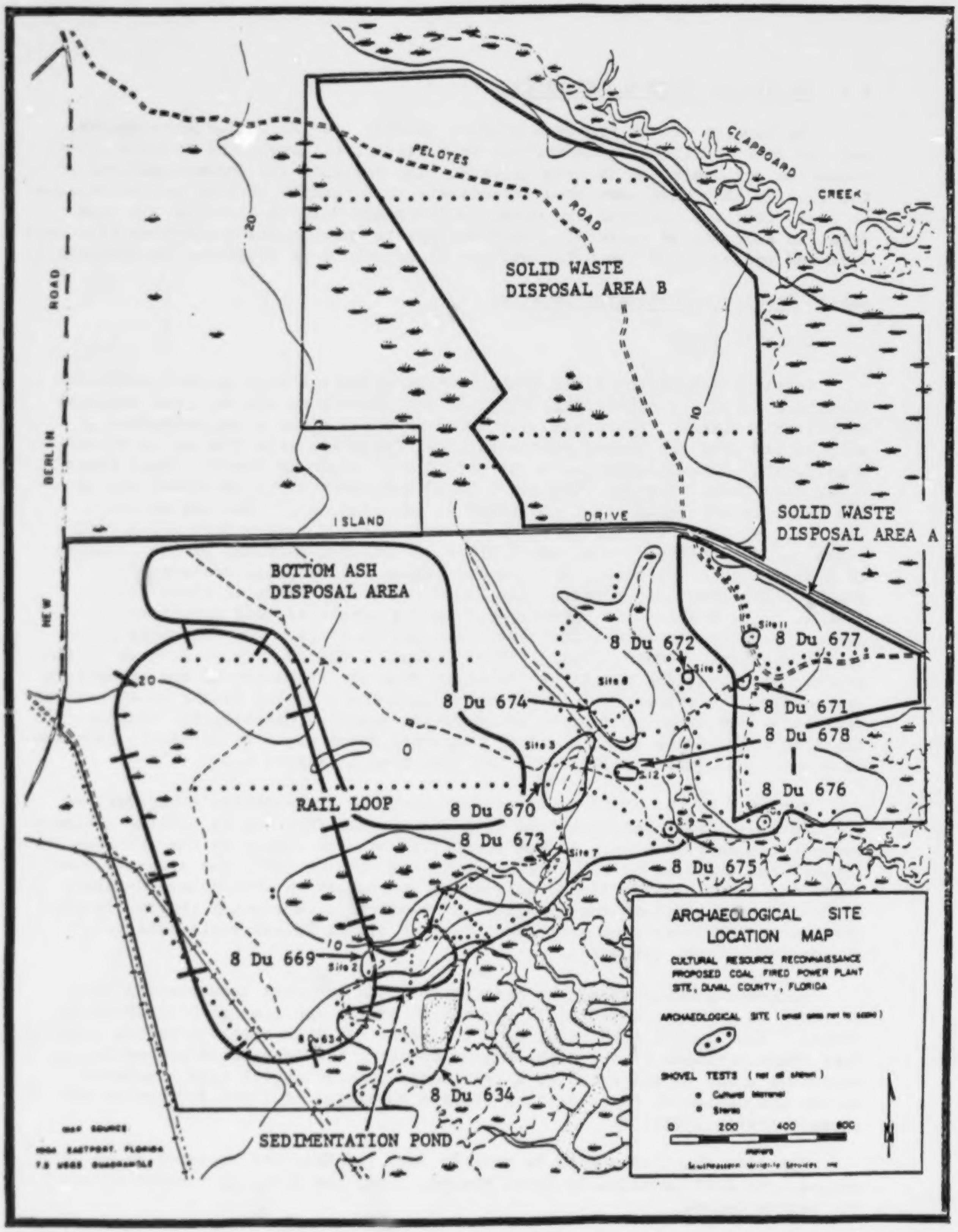
PELOTES ROAD
CLAPBOARD CREEK
SOLID WASTE DISPOSAL AREA B
20
10
NEW BERLIN ROAD
ISLAND DRIVE
SOLID WASTE DISPOSAL AREA A
BOTTOM ASH DISPOSAL AREA
8 Du 672
8 Du 677
Site 11
Site 5
Site 6
8 Du 674
8 Du 671
8 Du 678
Site 3
S.12
8 Du 676
0
RAIL LOOP
8 Du 670
8 Du 673
Site 7
S.9
8 Du 675
8 Du 669
Site 2
8 Du 634
SEDIMENTATION POND
MAP SOURCE
1964 EASTPORT, FLORIDA
7.5 USGS QUADRANGLE
ARCHAEOLOGICAL SITE LOCATION MAP
CULTURAL RESOURCE RECONNAISSANCE
PROPOSED COAL FIRED POWER PLANT
SITE, DUVAL COUNTY, FLORIDA
ARCHAEOLOGICAL SITE (small sites not to scale)
SHOVEL TESTS (not all shown)
Cultural Material
Sterile
0
200
400
800
meters
N
Southeastern Wildlife Services, Inc.

Figure 4.8-1. Archaeological site location map, SJRPP (Wood and Randolph 1980a).

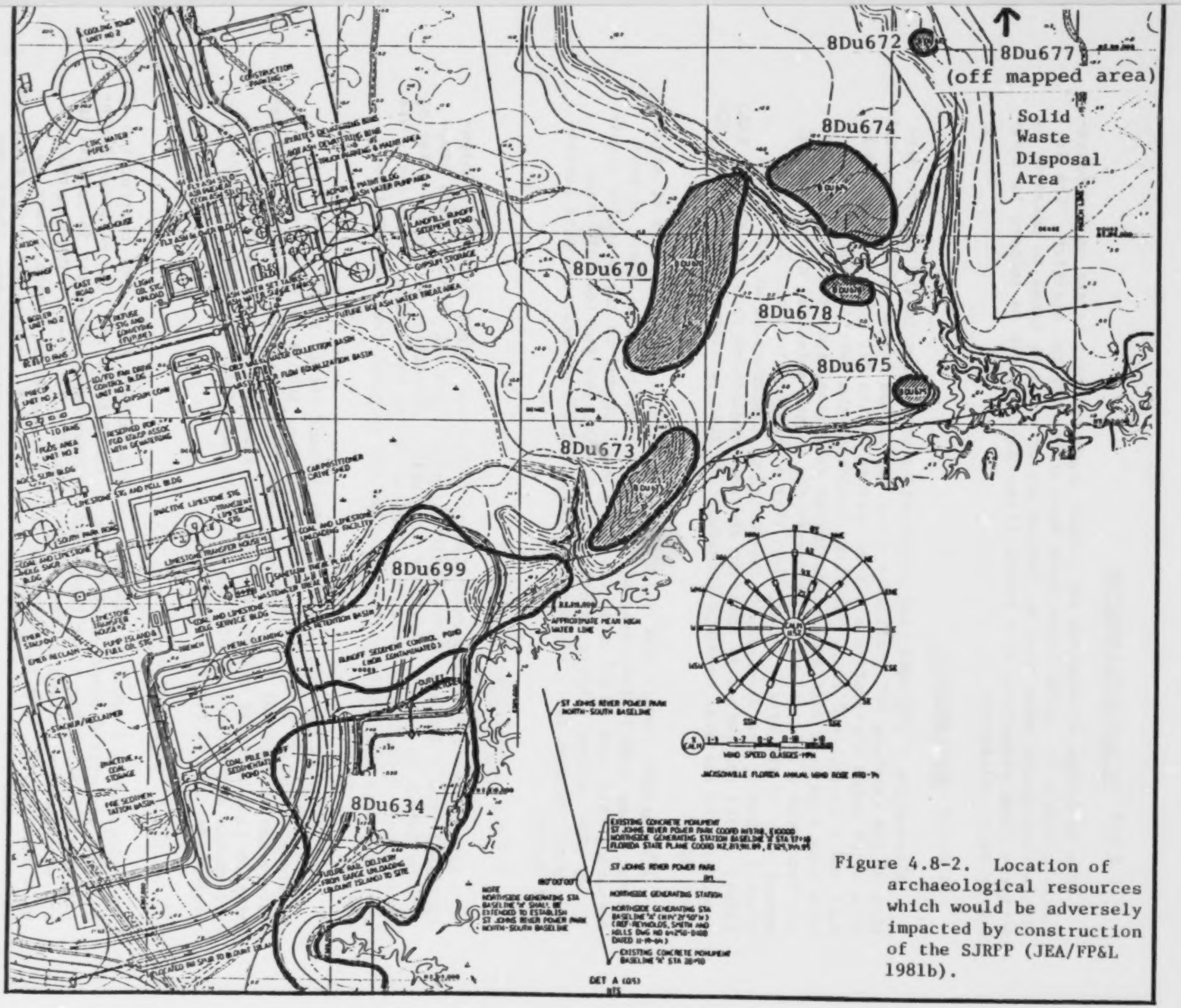
8Du672
8Du677 (off mapped area)
Solid Waste Disposal Area
8Du674
8Du670
8Du678
8Du675
8Du673
8Du699
8Du634

Figure 4.8-2. Location of archaeological resources which would be adversely impacted by construction of the SJRPP (JEA/FP&L 1981b).

4.8.1.2 No Action Alternative

The No Action Alternative may result in an indirect impact on the potentially eligible St. Johns River Power Park Archaeological District. The No Action Alternative means that no further action would be taken to preserve or mitigate these resources, as a result these resources may be subject to looting by relic collectors.

4.8.1.3 Alternative 1

Alternative 1 includes land modification activities in the eastern portion of the existing NGS plant site along San Carlos Creek. This a green belt area which under Alternative 1 may be used as a site for a 25-acre ash landfill and a 14-acre ash pond. If construction of the existing NGS has left this land area in a relatively undisturbed condition, then the Florida SHPO may recommend a cultural resource survey due to the potential archaeological sensitivity of the area. It is known that a prehistoric site, San Carlos Creek A (8Du91), was destroyed by the original construction at NGS (FDAHR 1980). USEPA has requested comments and recommendations from the Florida SHPO regarding the cultural resource assessment of this portion of the existing NGS plant site.

Alternative 1 would also require the construction of 150 miles of transmission lines from Tifton, Georgia to central Florida. The effect of constructing this line on cultural resources would depend on the specific right-of-way (ROW) chosen. After selection of the ROW, the Florida SHPO would determine the need for a systematic archaeological and historic site assessment survey.

4.8.1.4 Alternative 2

Alternative 2 involves expansion of facilities beyond the present boundaries of FP&L's Sanford Plant (Figure 2.6-7). Cultural resource data indicate no impact to National Register or eligible properties within the existing plant site. Site 8Vo166, which was located within the Sanford Plant site, was subjected to extensive disturbance during the original construction (Percy 1981b).

If conversion of the existing Sanford Plant should affect lands not severely disturbed by the original construction, then a cultural resource survey may be required by the Florida SHPO. Approximately 150 miles of transmission line corridor associated with this alternative may be subject to a systematic archaeological and historic site assessment depending upon the recommendations of the Florida SHPO.

4.8.1.5 Alternative 3

Alternative 3 requires expansion of the Sanford Plant and construction of a 280 MW coal-fired power plant by JEA at the SJRPP site. The National Register eligible St. Johns River Power Park Archaeological District is located in the southeastern portion of the SJRPP tract (Figure 4.8-2). The construction of a smaller rail loop and sediment control basin would probably have no impact on the potential archaeological district if the facilities are sited so that a buffer zone is provided to the western portions of sites 8Du634 and

8Du699. No impacts due to solid waste disposal would occur at site 8Du677 since the landfilling facility would be located north of Island Drive, an area which has been subjected to a systematic cultural resource survey. Alternative 3 also involves expansion of existing facilities at the Sanford Plant with the same associated impacts as discussed for Alternative 2.

4.8.1.6 Alternative 4

Alternative 4 includes expansion of existing facilities at the Sanford Plant. The impacts due to construction would be the same as for Alternative 2. This alternative also includes conversion of JEA's NGS Unit 3 and expansion beyond the existing plant boundaries. The additional land requirements would include 38 acres for an ash landfill and 64 acres for an FGD sludge landfill. If constructed as proposed (Section 2.6), the sludge landfill could adversely affect portions of the Archaeological District on the SJRPP project site although there would be less overall land disturbance. The siting of the sludge landfill would have similar adverse effects on these archaeological resources to those produced by the proposed project.

4.8.1.7 Comparative Analysis of Impacts due to Construction

Potential impacts to cultural resources may occur as a result of implementation of the proposed project, the No Action Alternative, and the four additional alternatives. A definitive comparison among alternatives is not possible, however, due to the availability of only limited data for the NGS and Sanford Plant sites. In general, the construction of the SJRPP would cause direct adverse impacts to the St. Johns River Archaeological District by destroying all or a portion of several sites. Other sites in the District may be isolated from the surrounding environment by construction activities. Alternatives 3 and 4 may also cause adverse impacts to this significant resource unless appropriate mitigation is implemented. Potential impacts also could occur on unknown resources near the Sanford site especially under the NSPS option. Impacts on unidentified cultural resources may occur under Alternatives 1 and 2 as a result of transmission line construction and expansion of the Sanford Plant in areas which have not been subjected to systematic archaeological or historic site assessment surveys. The proposed action, the No Action Alternative, and Alternatives 1, 2, 3, and 4 may result in indirect impacts to the SJRPP Archaeological District unless measures are taken to preserve this resource or to implement mitigative measures which would protect it from looting by relic collectors.

4.8.2 Operation-Related Impacts

Implementation of the proposed project as well as the four alternatives could cause impacts on cultural resources due to acid rains and activities that result in changes in the soil chemistry or the composition of the adjacent wetlands muck. The St. Johns Citizens for Clean Air have raised the question of adverse effects from emissions or acid rains on National Register properties in St. Augustine, Florida. No definitive evaluation can be made due to the present lack of knowledge concerning the impacts of acid rain. The Florida SHPO states however, that effects of acid rain on historic structures in St. Augustine would be either minimal or unmeasurable (Tesar 1981).

4.9 SOCIOECONOMIC IMPACTS

This section describes the potential socioeconomic impacts of the No Action Alternative, the proposed project (SJRPP), and each of the four additional alternatives. The primary areas of consideration include population impacts, economic impacts, and impacts on community services in the affected project regions. Each of these areas is considered according to the impacts resulting from the construction phase of each alternative and from the operation of each alternative.

4.9.1 Population Impacts

Impacts on the population caused by the proposed power plant and the proposed alternatives will result from construction and operation workers moving into the area to take advantage of the new employment opportunities. Many of these workers will bring their families and settle in the area (either on a temporary or permanent basis) and will create a market for some additional workers and their families to provide supporting services. The influx was determined by employing worker relocation data to a population influx model (Appendix Q).

4.9.1.1 Construction Impacts

The following sections identify the possible population impacts of construction activities for each alternative. The analysis focuses on the influx of construction workers, their families, and any secondary employment influx induced by the construction activities of each alternative.

No Action Alternative

Under the No Action Alternative, no power generating facility would be constructed nor any conversion undertaken. Consequently, the population of the Jacksonville/Duval County area and Sanford, Seminole County, and Volusia County should continue to grow as expected in the existing baseline projections.

SJRPP

The amount and pattern of settlement of the population influx resulting from SJRPP will have both positive and negative effects on the Jacksonville/Duval County area, although these impacts are expected to be moderate. The peak construction labor force is expected to be 2,316 workers by 1984. It is anticipated that 23% or 533 workers will relocate into the project region (JEA/FP&L 1981a). Of these 533 workers, 48.9% are expected to come with families, resulting in a total of 592 people (Mountain West Research, Inc. 1976; JEA/FP&L 1981a). Some of the other workers will bring a spouse and thus, a total of 1,005 people directly related to the construction of the SJRPP may relocate to the project region.

Non-basic secondary employment will also result from the influx of new people to the project area. Because of the availability of unemployed persons in Jacksonville/Duval County, however, it is expected that most of the non-basic secondary jobs generated by the proposed project will be filled by local residents. It is estimated that 95% of the induced employment should be absorbed by the local labor market. In addition, construction worker families should also absorb some of the jobs (an estimated 1.0%) (Mountain West Research, Inc. 1976). Consequently, only 4% of the induced service sector employment (4,076) or 163 workers are projected to immigrate into the project region. The total influx associated with the secondary service secondary employment is projected to be about 300 people. The influx of basic and non-basic immigrants is therefore estimated to total approximately 1,300.

The greatest influx of people should occur in Jacksonville/Duval County. For the SJRPP project, Jacksonville/Duval County may receive a maximum of 1,097 persons associated with the construction phase. Other areas receiving a greater influx of people should include Clay County (Orange Park), Nassau County (Fernandina Beach), and St. Johns County (St. Augustine). The total influx of 1,300 people into the project region should increase the projected population only slightly. No county is expected to receive a population increase of over 2.0%. Only Jacksonville/Duval County will receive a major influx of people from the construction phase of the proposed project, but this increase should not have major impacts.

Alternative 1

Population impacts of Alternative 1 will result primarily from the influx of people responding to the generation of new employment opportunities. Five counties could be impacted by the population influx resulting from the construction of refuse-generated power facilities. Potential sites being considered for refuse recovery facilities are located in Seminole County, Manatee County, Sarasota County, Brevard County, and Duval County. It is estimated that the peak construction work force for constructing a new refuse-powered facility would total 350 workers. Thus, considering the influx of new workers, the families they bring, and the influx from secondary employment generated, the construction of a new facility is expected to result in a maximum influx of almost 300 immigrants for any of the project areas. An influx of 300 people to any of these counties would constitute less than 1% of each county's 1980 population.

The conversion of JEA's Northside Units 1 and 2 to burn a coal and oil mixture is expected to require a peak work force of approximately 400 construction workers per unit. This peak work force, however, would last only a few months and the construction work force for the two units would overlap. Consequently, it is estimated that the peak work force for the entire project would be no more than 600 workers. The impacts of this conversion are expected to be concentrated in Jacksonville/Duval County. The conversion is expected to produce a peak influx of about 340 people of which approximately 290 would move to Jacksonville. This influx would constitute less than 1% of the 1980 County population.

Retrofitting residential hot water systems in the FP&L and JEA service areas would result in employment opportunities related to the design, manufacture, installation, and maintenance of new solar water systems. For the FP&L service area it is estimated that for six years (1982 to 1988) solar installation companies would need to employ approximately 1,140 people per year. After 1988, the number of employees for the retrofitting program is expected to decline. For the JEA service area, it is estimated that 80 workers per year would be needed during the peak six-year period.

The FP&L service area covers southern Florida and most of the eastern Florida coast. The retrofitting of these residential hot water systems is expected to be dispersed throughout the service area. While urban areas usually include larger residential areas, no one location is expected to receive a concentration of the solar conversion. Consequently, it is expected that the employment opportunities generated by the retrofitting will be dispersed throughout the service area. The annual need for 80 workers in JEA's service area should be adequately supplied by the Jacksonville area.

Construction of the transmission lines for Alternative 1 would occur from Tifton, Georgia to Ft. White, Florida, and from Ft. White to central Florida. The construction of these lines may generate new employment opportunities, but no significant influx of people is expected to immigrate to any one particular locale. The purchase of power considered under Alternative 1 from Georgia Power's Plant Vogtle is also not expected to result in any population impacts for specific areas.

Alternative 2

The conversion of FP&L's Sanford Units 4 and 5 from oil to coal is estimated to require a peak construction labor force of 750 workers. This estimation is based on the assumption that a regular schedule will be maintained and that construction will require approximately 26 months. The total amount of time the units should be out of service on such a schedule is nine months. The peak construction work force for the Sanford Plant conversion should occur during 1984. Of the 750 workers to be employed in the construction phase of this conversion, 23% or 173 workers may be expected to relocate in the region. Approximately 130 of these workers are expected to bring families. Thus, the 23% influx of construction workers could result in 327 people coming into the area as a direct result of the Sanford conversion.

In addition to the basic construction jobs generated by the project, non-basic secondary jobs also will be created. It is estimated that the induced service sector employment will total 1,321 jobs of which 90% (or 1,189) of the jobs will be filled by the local labor force or family members of construction workers. An influx of 132 workers (10%) and their families is expected to occur as a result of the secondary employment induced by the project. Consequently, the peak construction labor force for converting the FP&L Sanford units may result in 327 people coming to the region as a direct result of construction employment. An additional 249 persons should be expected to arrive from secondary employment induced by the project and a total population influx of 576 is anticipated as a result of the power plant conversion.

Only the cities of Sanford and Orlando are expected to receive any sizeable influx of people. Of these two communities, only Sanford's influx should constitute an increase of close to 1% of the population. While Orlando may receive a relatively large number of the project's immigrants, this influx should constitute a very small percentage of the total Orlando population and have little impact on the social and economic conditions of Orlando. The influx to Sanford may affect community services, but the impacts are expected to be minimal.

Alternative 3

In Alternative 3, the smaller JEA coal-fired plant is projected to be 280/1,110 or approximately 25% of the size of the SJRPP. Thus, the socioeconomic impacts of the smaller plant are based on scaled-down information from the SJRPP.

The peak construction work force of the smaller coal-fired plant is projected to be 579 workers. Of this work force, 133 laborers may immigrate to the project region bringing with them an additional 85 family members. From the secondary service sector jobs generated from constructing this plant, some 77 people could be expected to move into the project region. From the total influx of this alternative project, an estimated 277 people are expected to move into Jacksonville/Duval County. This influx of people, however, would constitute less than 0.5% of the County population and is not expected to affect the community greatly.

Alternative 4

The peak work force necessary to convert the NGS Unit 3 is estimated to be 750 workers. The construction of this project should take approximately 24 to 26 months, although the peak force should exist for a much shorter time. 173 construction workers are expected to move into the project region bringing with them 112 family members. The non-basic service employment generated by the construction could result in approximately 100 people moving to the region. The primary area which would be affected by this conversion is Jacksonville/Duval County. It is projected that of the 427 immigrants expected to move into the project region, 360 would most likely move into Jacksonville. This influx, however, constitutes less than 0.5% of the 1985 population.

Comparison of Impacts

The SJRPP project could generate an influx of more than 1,000 people to the Jacksonville/Duval County area (Table 4.9-1). Each of the other alternatives would result in an influx of less than 500 people to any one community. The second greatest influx would occur in Orlando from the conversion of FP&L's Sanford Units 4 and 5 (Alternatives 2, 3 and 4). These immigrant populations, however, are not expected to be significant for any of the communities including Jacksonville/Duval County and Orlando. Even the influx associated with the construction of SJRPP should constitute at most 2.3% of the 1984 population projected for Jacksonville/Duval County. The construction work force for each project will be temporary and the increased number of people should be adequately served by all affected communities.

4.9.1.2 Operation Impacts

The following sections identify the population impacts associated with the operation of each alternative. The analysis centers on the population influx resulting from the basic operational employment created, secondary service sector employment generated by the operation phase, and any family members accompanying these workers.

Table 4.9-1. Construction phase impacts of SJRPP and the alternatives to community populations.

Alternative	Size of Peak Construction Labor Force	Regional Population Influx	Projected Population Influx By Specific Locale
No Action	-	-	-
SJRPP	2,316	1,288	1,095: Jacksonville/ Duvall County
Alternative 1			
Each refuse-powered facility	350	300	200: Any of 5 counties
Conversion of NGS Units 1 and 2 to COM	600	340	300: Jacksonville/ Duval County
Residential Solar Conversion			
FP&L	1,140	unknown	dispersed throughout FP&L's service area
JEA	80	-	-
Alternative 2			
FP&L's Sanford Plant Conversion	750	576	237: Sanford 406: Orlando
Alternative 3			
Smaller JEA coal-fired facility	579	328	277: Jacksonville/ Duval County
FP&L's Sanford Conversion	750	576	237: Sanford 406: Orlando
Alternative 4			
Conversion of NGS Unit 3	750	427	360: Jacksonville/ Duval County
FP&L's Sanford Plant Conversion	750	576	237: Sanford 406: Orlando

No Action Alternative

The No Action Alternative would postpone the construction of any new facilities or the conversion of existing facilities until a later date. Consequently, no jobs would be generated during operation nor would any secondary service sector positions be created. The population of the relevant communities should increase as presently projected.

SJRPP

The number and settlement pattern of immigrant operation workers from SJRPP will have certain positive and negative effects on the Jacksonville area although these impacts are not expected to be great. Operation workers should begin to be employed during 1984 with operation expected to continue through the year 2027. The peak operating work force of 375 is expected to be reached by 1987 and remain at this level until 2025.

It is expected that a great majority (85%) of operation phase employees will come from the local labor force. Approximately 147 people are expected to move into the area. Of this influx, approximately 56 persons (38%) will be non-local workers needed to operate the proposed new power plant. The remaining 91 new residents will be composed of workers family members.

Only Jacksonville/Duval County is expected to receive any significant influx of people. It is estimated that 124 people can be expected to settle in Jacksonville/Duval County as a result of the operation of the proposed power plant. Because of the size of Duval County, however, this influx represents a very small increase in the projected population and is expected to have very little impact on the population. None of the other counties within the project region is expected to receive a major influx of people from the operation phase.

Alternative 1

Population impacts from Alternative 1 would occur only from operation of refuse-fired facilities. No population impacts are expected to occur due to the operation of the residential solar hot water systems or the additional 150 miles of transmission lines. The operation of the NGS Unit 1 after being converted to use a coal and oil mixture is not expected to require any additional operation staff. Consequently, no population impacts should be realized from the operation of this converted unit.

The operation of new refuse-fired facilities would create new employment opportunities in the project area. The labor required to operate a 50 MW plant is approximately 55 people. A maximum of 38 workers is expected to move into the area as a result of the operational employment opportunities. Because the labor requirements are quite small, it is possible that the local labor force of each community would fill the employment positions. Therefore, very few (if any) impacts are expected to result from the operation of the refuse-fired facilities.

Alternative 2

Only the operation of FP&L's converted Sanford Units 4 and 5 would result in any population impacts for this alternative. The operation of the Sanford Plant, once conversion of Units 4 and 5 has taken place, is projected to incorporate an increase of 76 employees excluding additional maintenance staff. The additional 76 workers should be employed by the end of 1985 when Units 4 and 5 are projected to go on-line.

It is predicted that 85% of the additional operation work force will be supplied by local labor. Thus, 11 operational employees may be expected to move into the project area because of the coal conversion project. The resulting influx from the basic operational work force resulting from the conversion should total only 29 persons. However, secondary employment may also be generated by the additional work force at the Sanford Plant. An estimated 143 secondary jobs could be generated. Of these secondary positions, 10 may be filled by persons moving into the area. It is estimated that a total influx of 55 persons should be anticipated as a result of basic and secondary employment induced by the conversion of Sanford Units 4 and 5.

Since the operation work force is more permanent than the construction work force, the operation employees may be more likely to locate closer to the plant. Consequently, for purposes of assessing project impacts, a worst case scenario is used. This scenario assumes that all 55 people would locate in the City of Sanford. Nevertheless, this influx from the increased operational staff constitutes less than 0.2% of Sanford's projected 1985 population. This influx is expected to have minimal impact on the community.

Alternative 3

The impacts from Alternative 3 include the operational impacts of FP&L's converted Sanford Units and the operation of a new coal-fired power plant similar to SJRPP but approximately 75% smaller. It is estimated that the peak labor force necessary to operate this smaller coal-fired power plant would total about 95 people. Most of the operational staff positions are expected to be filled by the local labor force. Of the 95 workers needed, 14 may be expected to move into the area as a result of such employment opportunities. These workers may be expected to bring families which could mean a total influx of 37 people.

The service sector employment generated by the operation of this plant could possibly result in 179 additional employment opportunities. These service sector jobs, however, are expected to be filled by the local labor force and the families of operation workers. Therefore, no specific influx is expected to occur from the generation of secondary employment.

Alternative 4

The primary impacts of Alternative 4 relate to the conversion of FP&L's Sanford Units and the conversion of JEA's Northside Unit 3 boilers from burning oil to coal. The conversion of the NGS Unit 3 would require an additional operating staff of approximately 100 employees excluding maintenance staff requirements. The addition of 100 operational staff positions at JEA's NGS could bring a small number of people into Jacksonville. It is estimated

Table 4.9-2. Population impacts for the operation of SJRPP and the various alternatives.

Alternative	Peak Operation Labor Force	Regional Population Influx	Influx to Specific Locale
No Action	-	-	-
SJRPP	375	147	124: Jacksonville/ Duval County
Alternative 1			
Each refuse-fired facility	55	38	38: any of five counties
Alternative 2			
Conversion of FP&L's Sanford Units 4 and 5	76	55	55: Sanford
Alternative 3			
Smaller coal-fired JEA Plant	95	37	37: Jacksonville/ Duval County
Conversion of FP&L's Sanford Units 4 and 5	76	55	55: Sanford
Alternative 4			
Conversion of NGS Unit 3 to coal fired	100	40	40: Jacksonville/ Duval County
Conversion of FP&L's Sanford Units 4 and 5	76	55	55: Sanford

that no more than 15 of the positions would be filled by workers moving into the area. These 15 workers could, however, produce a total influx of some 40 people including their family members. These people are all expected to locate in the Jacksonville area, yet such an influx should have no adverse impacts. The secondary employment generated by these additional operation positions are expected to be filled by the local labor force and operational workers' families, thereby creating no additional influx of people.

Alternative 4 would result in population increases for both Sanford and Jacksonville. The operation of Sanford's Units could mean an additional 55 people for the Sanford community while the conversion of NGS Unit 3 could mean an influx of 40 people to Jacksonville. These increases are small and are not expected to result in any adverse impacts.

Comparison of Impacts

None of the proposed alternatives are expected to result in adverse operational impacts to any specific populations. As identified in Table 4.9-2, the proposed SJRPP project would clearly add the greatest number of new people to one single community. Yet this additional 124 people would constitute a minor increase in Jacksonville's population. Alternative 1 has the potential for affecting the greatest number of communities since five counties have been identified as possible locations for refuse-fired power plants. Alternatives 2 and 3 would mean an influx of people to both Sanford and Jacksonville. Nevertheless, the increases associated with these alternatives are interpreted as relatively minor additions to the population and are not expected to result in any adverse impacts.

4.9.2 Economic Impacts

In addition to the influx of people resulting from employment opportunities associated with the various alternatives, the construction and operation of the projects can be expected to impact the economies of the project regions. While economic impacts may vary greatly with the project and the community, comparative assessments can be made for certain aspects of the alternatives. This analysis focuses primarily on the economic impacts of both the construction and operation phases for the payroll of the basic labor force; the payroll of secondary service sector employment induced by the project; and any taxes expected to be paid by JEA and/or FP&L to the local communities.

4.9.2.1 Construction Impacts

This section identifies the income generated by the construction of each proposed alternative. The level of income generated by basic construction payrolls and induced secondary payrolls provides a basis for comparing the relative economic effects of each alternative. Local taxes are not included in this section since the bulk of taxes will occur during the operation of the project.

No Action Alternative

This alternative would postpone construction of new power generating facilities to a later date and thereby also postpone any subsequent income generated into local economies. The impact of this option is to delay construction costs and the generation of local revenue to a future date.

SJRPP

In addition to the employment opportunities afforded by the operation of the proposed project, the construction of the project can be expected to have an impact upon the economy of the local region. During project construction more than 6,300 temporary employment opportunities will be created as a result of basic construction jobs and induced service sector employment. The total construction force payroll for the proposed project is projected to be as much as $206 million (1980 dollars) (JEA/FP&L 1981a). This payroll will be spread over a six-year period. The economy of the region, however, will also be affected by the non-basic secondary jobs generated from the construction of SJRPP. Of the 6,300 jobs created during the construction phase, 4,078 temporary, non-basic secondary jobs are expected to be created. The construction of this plant is expected to generate over $150 million (1980 dollars) in secondary employment and a total of approximately $360 million for basic and non-basic salaries. The peak annual payroll for basic employees is estimated to be about $60.2 million while the peak payroll for non-basic employees should be about $44.5 million. However, because of payroll expenses, the actual amount of payroll reaching the local economy will be substantially less than $360 million. About $288 million would actually reach the employees in net income with the Jacksonville/Duval County economy actually receiving about $243 million.

Alternative 1

It is estimated that approximately 350 workers will be needed for the construction of a refuse-powered facility. The income generated from the construction payroll of such a facility is therefore estimated to total about $9.1 million annually during the peak construction period. Taking into account a 20% deduction for payroll expenses, approximately $7.3 million of basic construction salaries could be expected to enter the local economy of the county in which the facility is located.

The non-basic secondary jobs induced by the construction of these facilities could mean an additional $6.2 million in secondary salaries. Of this payroll total, about $4.9 million would actually reach the employees. Therefore, the combination of basic and non-basic payrolls associated with the construction of each refuse-powered facility is expected to generate an additional $12.2 million for the local economy.

The conversion of JEA's Northside Units 1 and 2 to burn a coal and oil mixture is expected to require a peak construction work force of 600 employees. The payroll for these employees is estimated to total $15.6 million. Of this payroll, the workers would actually receive about $12.4 million with about $10.4 million reaching the Jacksonville economy. The non-basic secondary work force should generate about $10.8 million with about $7.3 million reaching the Jacksonville area. Thus, the total net income resulting from basic and non-basic payrolls associated with the conversion of NGS Units 1 and 2 is projected to be about $17.7 million for Jacksonville.

Retrofitting residential hot water systems for the FP&L service area would result in the employment of about 1,140 people per year from 1982 to 1986. This direct employment would generate a payroll of about $29.6 million of which about $23.6 million actually would reach the employees. The secondary employment induced by the retrofitting could result in $15 to $20 million in additional income. This income, however, would be dispersed over much of Florida and no one community is expected to receive a greater proportional share of the income. The 80 employees estimated to be needed to retrofit the systems in the JEA service area would result in over $2 million in salaries to the Jacksonville area.

Construction of the 150 miles of transmission lines will also generate income in the form of payroll salaries. The data regarding the exact number of employees needed are not available, however. Consequently, no payroll income estimates have been projected. The employees are expected to reside in numerous areas and no one particular community is expected to be greatly impacted.

Alternative 2

The conversion of FP&L's Sanford Units 4 and 5 can be expected to impact the economic conditions of the project region. The primary sources for these impacts are expected to be the payroll of the construction labor force and the payroll of the secondary employment induced by the construction phase. The peak construction work force for converting FP&L's Sanford Units 4 and 5 is projected to be 750 employees. The greatest peak annual income expected from conversion is estimated to be over $33 million. Of this $33 million, $19.5 million will be created directly by the peak construction labor force. The secondary employment should account for more than $13.5 million. Once payroll expenses are deducted, the basic workers payroll should total about $16 million while the secondary payroll should generate about $10.8 million. It is estimated that about $14.6 million would enter the Orlando economy while about $9 million should reach Sanford.

Alternative 3

In addition to the income generated by the Sanford Plant conversion, Alternative 3 would include payroll income resulting from the construction of a small coal-fired power plant in Jacksonville. The labor force of the smaller coal-fired plant should lead to a payroll of approximately $15 million annually of which at least $10 million can be expected to enter the Jacksonville economy. The non-basic labor force induced by the construction of this plant should generate an annual payroll of $10.4 million with about $7 million entering the Jacksonville economy. In summary, a total of about $17 million may reach the Jacksonville economy as a result of constructing the smaller JEA coal-fired power plant. Approximately $14.6 million would enter the Orlando economy and $9 million would reach Sanford as a result of converting the Sanford Units 4 and 5.

Alternative 4

This alternative would include the payroll income generated by the conversion of Sanford Units 4 and 5 as well as that resulting from the conversion of the NGS Unit 3. The maximum work force necessary to convert the NGS from oil-burning to coal-burning is estimated to total 750 workers. This work force should result in a construction payroll of approximately $19.5 million. Of this payroll, the workers should actually receive about $15.6 million and over $13 million should eventually reach the Jacksonville economy. The non-bas-

Table 4.9-3. Construction phase payroll income from SJRPP and the various alternatives.

Alternative	Peak Annual Construction Payroll (in 1980 dollars)	Peak Annual Non-Basic Payroll (in 1980 dollars)
No Action	-	-
SJRPP	$60.2 million	$44.5 million
Alternative 1		
Each refuse-powered facility	$9.1 million	$6.2 million
Conversion of NGS Units 1 and 2 to COM	$15.6 million	$10.8 million
Residential Solar Conversion	$29.6 million	$20.0 million
Alternative 2		
Conversion of FP&L's Sanford Units 4 and 5	$19.5 million	$13.5 million
Alternative 3		
Smaller, coal-fired plant	$15.0 million	$10.4 million
Conversion of FP&L's Sanford Units 4 and 5	$19.5 million	$13.5 million
Alternative 4		
Conversion of NGS Unit 3	$19.5 million	$13.5 million
Conversion of FP&L's Sanford Units 4 and 5	$19.5 million	$13.5 million

ic employment should generate a payroll of over $13.5 million of which over $9 million could be expected to reach Jacksonville.

Thus, the impacts of this alternative would include payroll income added to the economies of Sanford, Orlando, and Jacksonville. The conversion of the Sanford Units would mean an addition of about $14.6 million to Orlando and $9 million to Sanford. Conversion of the NGS would add about $22 million to the Jacksonville area.

Comparison of Impacts

Clearly, the greatest amount of income generated by any of the alternatives is that resulting from the basic and non-basic secondary payrolls for SJRPP. Table 4.9-3 presents an overview of the total income generated by the construction of these alternatives. The SJRPP payrolls could mean the addition of some $104.7 million into the Jacksonville economy. Alternative 1 would also have rather profound economic impacts since a possible $90.7 million could result from construction payrolls associated with the building of refuse-powered facilities, converting the NGS Units 1 and 2, retrofitting residential hot water systems throughout part of Florida, and building 150 miles of transmission lines. The secondary employment induced from these actions could total an additional $61.8 million. These actions, however, are widely dispersed and the economic impacts to any one community are not expected to be great. Alternatives 2, 3, and 4 would affect both the Jacksonville area and the Sanford area but the impacts are expected to be minimal for each area.

4.9.2.2 Operation Impacts

While the impacts of constructing these alternatives will be rather temporary, the effects of operating the projects will extend over a much greater period depending upon the life of the project. The following sections identify the economic impacts expected to occur from the operation phase of the various alternatives. These impacts are expected to be generated primarily by the income from operation payrolls, induced secondary employment payrolls, and local taxes paid during the projects' operation.

No Action Alternative

Under the No Action Alternative the operation of any new facilities would be postponed to a later date. Operational costs and public revenues associated with the operation phases of these alternatives would be realized at a future date.

SJRPP

The operation of the proposed SJRPP will result in the generation of 375 basic operation jobs plus 700 non-basic secondary employment positions. The total operation payroll for the years 1984 to 2027 may surpass $269 million (1980 dollars) with an annual payroll of over $6.3 million from 1987 to 2025. While payroll expenses will decrease the actual amount distributed among the employees, over $5 million annually should be expected to reach the employees. Again, the greatest portion of this payroll should be distributed in the Jacksonville/Duval County area with about $4.2 million going into the area each year between 1987 and 2025.

The secondary employment induced from the operation of SJRPP is expected to generate over $326 million between 1984 and 2027 with an annual secondary payroll of about $7.2 million between 1987 and 2025. Accounting for the deduction of payroll expenses, Jacksonville/Duval County should receive about $4.8 million annually in secondary payroll income during this 39-year operating period.

The local economy will also be affected by the generation of public revenues resulting from the project. Because 20% of the proposed project is to be owned by FP&L, this percentage of the plant's value would be subject to local taxation. By applying the 2% property and miscellaneous tax to the 20% of the SJRPP value, it is estimated that approximately $7 million would be paid in local taxes if Blount Island is not included and about $7.6 million if Blount Island is included in the project. The JEA feels that having SJRPP as a long-term, reliable source of lower cost electric power will be an inducement to industry to locate in Jacksonville.

Alternative 1

The economic impacts of Alternative 1 are expected to result from the operation of refuse-powered plants; the operation of the converted NGS Units 1 and 2; and the operation of residential solar water heaters. The primary source of impacts would result, however, from the operation of the new refuse-powered facilities. The labor force required to operate one of the refuse-powered facilities is estimated to total 55 people. This labor force would result in an operation payroll of approximately $937,000 per facility. After payroll expenses are deducted about $750,000 could be expected to enter the economy of the county in which the facility is located. This operatonal work force will also induce non-basic secondary employment. A secondary work force of about 100 people should be expected with a payroll totaling a little more than $1 million. Together with the operational payroll, each facility should be expected to generate about $1.5 million annually in basic and non-basic payrolls which actually reach the employees.

Each refuse-powered facility would also mean additional taxes for the county in which the facility is located. The amount of taxes paid for the facilities varies, however. The Seminole County facility is expected to result in $.8 million, the Brevard County facility would generate $1.9 million, Manatee County's facility would result in $1.0 million, and the facility in Sarasota County would generate $1.2 million in additional taxes. If all five facilities were constructed, the total amount of taxes generated would be about $4.9 million. These refuse-powered facilities are expected to generate such taxes for a project life of 15 years (although the actual lifetime of the project should be greater).

The operation of NGS Units 1 and 2 are not expected to require any additional operating staff. Consequently, no payroll income from basic or non-basic employees is projected. The conversion of the NGS Units 1 and 2 to burn a coal and oil mixture would increase the total value of the NGS. Since JEA is a municipally owned utility, no increases in taxes would occur under the conversion.

The operation of residential solar water heaters should require some additional maintenance workers to keep the systems operable yet no data is available for projecting such maintenance requirements. The taxes expected to be generated by the conversion of residential hot water systems are expected to total approximately $20 million. These taxes should, however, be dispersed among many Florida counties. The addition of these solar residential systems may also result in certain tax credits for those residents who install them. These credits would most likely be Federal and State level income tax credits and should not directly affect the economy of local communities.

While there are no specific operational impacts associated with the transmission lines, taxes would be paid to local counties. Taxes resulting from the construction of the transmission lines is estimated to total about $0.4 million. These taxes would be paid to various counties through which the lines pass. A breakdown of the taxes paid to each county is not available. No adverse impacts are expected to result from the payment of these additional taxes.

Alternative 2

The economic impacts resulting from the conversion of Sanford Units 4 and 5 should result primarily from the payroll of the additional operation labor force, the payroll of induced secondary employment, and any additional taxes paid by FP&L to Volusia County as a result of the conversion. The conversion is expected to require an additional operating staff of 76 employees. In addition, 143 non-basic secondary jobs should be generated. The peak annual income expected from converting the Sanford Units is estimated to total over $2 million of which $1.3 million will be generated by the employment of the additional 76 operation workers. The remaining $776,948 is to result from secondary employment. However, only $1.6 million should actually reach the Sanford economy. While this additional revenue may be associated with economic growth in the community, the amount is considered to be relatively small and the impacts should not be adverse.

The economic conditions of the project area could also be affected by additional taxes associated with the conversion of these two units. Since these two units will increase the value of FP&L's Sanford Plant, annual property taxes paid to Volusia County should increase. Taxes associated with the conversion of the Sanford Units 4 and 5 will vary depending on whether a scrubber is included in the conversion. With a scrubber, the plant should result in about $9.7 million in taxes to Volusia County. If the plant conversion does not include a scrubber, local taxes should total approximately $6.1 million.

It should be pointed out that the local taxes paid by FP&L will go to Volusia County. The workers associated with plant construction are expected, however, to reside in either Orange County (Orlando) or Seminole County (Sanford). While these workers may generate sales taxes and certain individual property taxes in their respective communities, the plant itself will not result in the payment of property taxes to the counties in which the employees reside.

The 150 miles of transmission lines should not generate any additional operational payroll income, but property taxes on the lines will be paid to local governments. Approximately $.4 million is expected to be paid in local taxes for the transmission line corridor. These taxes will be distributed among various counties.

Alternative 3

Under Alternative 3 the primary economic impacts should occur from the operation of the proposed smaller JEA coal-fired power plant as well as the operation of Sanford's converted Units 4 and 5. The peak operating labor force for the smaller coal-fired power plant is estimated to be 95 persons. This operating work force should generate a payroll of approximately $1.6 million of which about $1.2 million would actually be paid to the employees. The Jacksonville area economy would receive about $1 million annually from this operation payroll. The additional 179 non-basic secondary labor force would generate about $1.8 million in payroll income of which about $1.2 million would enter the Jacksonville area economy. The basic and non-basic payrolls should be expected to result in a total of about $2.2 million annually for the Jacksonville area. Thus, Alternative 3 would generate $2.2 million for Jacksonville and about $1.6 million for Sanford.

There would be no property taxes generated by this smaller coal-fired plant since JEA would be the sole owner. There could be some payments by JEA made "in lieu of taxes", but the amount of these payments cannot be determined at this time. The conversion of Sanford Units 4 and 5 would generate about $9.7 million to Volusia County (with a scrubber) or about $6.1 million (without a scrubber). The construction of transmission lines would generate approximately $.4 million in taxes to the various counties in which they are located.

Alternative 4

The economic impacts of Alternative 4 are expected to result from the conversion of JEA's Northside Unit 3 as well as the conversion of the Sanford Units 4 and 5. The conversion the NGS Unit 3 is expected to require an additional operating staff of 100 employees. The payroll for this staff should total about $1.7 million, with the employees actually receiving about $1.3 million and approximately $1.1 million reaching Jacksonville's economy.

The secondary employment induced by this additional operating work force is estimated to total about 188 workers and an additional payroll income of about $1.9 million. The Jacksonville area is projected to receive about $1.2 million as a result of the induced secondary employment. The combined payroll income expected to enter the Jacksonville area as a result of the basic and non-basic employment totals $2.3 million annually. Thus, for Alternative 4 the conversion of the Sanford Units 4 and 5 is expected to result in an annual addition of $1.6 million for Sanford while the converted NGS Unit 3 would result in about $2.3 million for Jacksonville.

The conversion of the NGS Unit 3 by JEA would not result in any additional taxes for Jacksonville/Duval County. The only public revenues generated by this alternative would be those paid to Volusia County for the conversion of Sanford Units 4 and 5 or between $6.1 and $9.7 million.

Comparison of Impacts

The proposed SJRPP project has the potential for the greatest economic impacts to one community (Table 4.9-4). The operational labor force of 375 people plus the secondary labor induced by these operational workers would generate approximately $13.5 million in additional payroll income. In addi-

Table 4.9-4. Economic impacts associated with the operation phase of SJRPP and the various alternatives.

Alternative	Annual Operation Payroll	Annual Non-Basic Secondary Payroll	Taxes to Local Governments
No Action	-	-	-
SJRPP	$6.3 million	$7.2 million	$7 million (without Blount Island) $7.6 million (with Blount Island)
Alternative 1			
Each refuse-powered facility	$0.9 million	$1.0 million	$0.8 million: Seminole County $1.9 million: Brevard County $1.0 million: Manatee County $1.2 million: Sarasota County
Residential solar conversion	(unknown)	(unknown)	$20 million: dispersed throughout various counties
Transmission lines	-	-	$0.4 million: dispersed throughout various counties
Alternative 2			
Conversion of FP&L's Sanford Units 4 and 5	$1.3 million	$0.77 million	$9.7 million (with srubber): Volusia County; or $6.1 million (without scrubber Volusia County
Transmission lines	(unknown)	(unknown)	$0.4 million: dispersed throughout various counties
Alternative 3			
Smaller JEA coal-fired plant	$1.6 million	$1.8 million	-
Conversion of FP&L's Sanford Units 4 and 5	$1.3 million	$0.7 million	$9.7 million (with scrubber): Volusia County or $6.1 million (without scrubber): Volusia County

Table 4.9-4. Economic impacts associated with the operation phase of SJRPP and the various alternatives (concluded).

Alternative	Annual Operation Payroll	Annual Non-Basic Secondary Payroll	Taxes to Local Governments
Transmission lines	(unknown)	(unknown)	$0.4 million: dispersed throughout various counties
Alternative 4			
NGS Unit 3 Conversion	$1.7 million	$1.9 million	-
Conversion of FP&L's Units 4 and 5	$1.2 million	$0.7 million	$9.7 million or Volusia County

tion, the amount of taxes paid by FP&L for SJRPP is surpassed only by the conversion of Sanford Units 4 and 5 with a scrubber in the amount of public revenues generated. The operations associated with Alternative 1 would generate the greatest amount of total income, but would be dispersed among the greatest number of people and would not be concentrated in one single community.

4.9.3 Community Services

The construction and operation of any of the proposed alternatives could affect the services offered by each community. The influx of people associated with these proposals could result in additional demands upon the affected communities and their ability to provide services. The following sections identify community service impacts associated with the construction phase and operation phase of each alternative. Considered in this analysis are impacts on the following: water supply and wastewater treatment; public safety; educational facilities; health care; and housing. The assessment of impacts on local community services is based on the projected population growth without the proposed project and the population influx anticipated with the proposed project.

4.9.3.1 Construction Impacts

The following sections identify the impacts of the No Action Alternative, the proposed project (SJRPP), and the four alternatives on the services of the affected communities. These impacts are expected to result from the additional influx of people occurring from the construction phase of each alternative.

No Action Alternative

Under the No Action Alternative there would be no new facilities constructed or existing facilities converted and therefore no new influx of people would affect the project communities. The future baseline conditions would remain as projected.

SJRPP

The influx of 1,005 people directly related to the project plus the additional 1,298 non-basic secondary influx should not put a strain on Jacksonville/Duval County's water supply. The area's supply is expected to adequately serve this temporary influx. The wastewater treatment system is also operating with excess capacity. This system has a 3-stage (1984, 1988, and 1990) projected expansion schedule which should adequately serve the immigrant construction population (JEA/FP&L 1981a).

The law enforcement staff of Jacksonville/Duval County was reported in 1980 to have an excess of 161 full time personnel (JEA/FP&L 1981a). There is expected to be an immigrant demand of four staff personnel for the peak labor force. The projected excess of law enforcement employees should absorb this demand, however. The temporary influx also should not adversely affect the system's ability to provide adequate law enforcement services. The demands made by the construction phase influx are not expected to adversely affect local fire protection services. These services should be adequately provided by the Jacksonville/Duval County Fire Department (JEA/FP&L 1981a).

The immigrant population associated with the construction of SJRPP will generate additional students for the Jacksonville/Duval County School System. The physical facilities have a current excess of 4,400 pupil stations and are expected to be able to absorb the additional students. Additional instructors may need to be employed as a result of this influx. The peak demand is estimated to require a maximum of five additional teachers resulting in the annual cost of about $144,600 (JEA/FP&L 1981a). This requirement, however, should decline after 1985.

The current housing surplus in the Jacksonville area is estimated to total 11,000 units (JEA/FP&L 1981a). It is projected that the vacancies in housing between 1982 and 1987 will range from about 11,600 to 12,400. Because the construction employment is rather temporary, it is assumed that a large portion of the influx will desire rental housing. As a result of the steady increase in apartment construction during the 1970's, there should be adequate rental housing for the construction influx. The number of single family dwellings has also increased rather steadily and such units should also be available on a rental basis.

Alternative 1

The major construction impacts of Alternative 1 center on the construction of refuse powered facilities and the conversion of JEA's Northside Units 1 and 3. The retrofitting of residential hot water systems and the construction of transmission lines should not have significant impacts on any particular community.

Five counties have been identified as potential sites for refuse-powered facilities. Each of these facilities is estimated to require a construction work force of 350 people. The influx of basic and non-basic workers is estimated to total a maximum of 200 people for each facility. No major impacts are expected to result from this construction influx. Each county is expected to have an adequate water supply for the immigrant population and the influx should not strain the supply for the existing population. The influx should not require any additional public safety personnel; therefore, the projected service level should adequately meet their needs. The county school systems should be able to absorb the influx of school children although a few additional instructors may be required. The housing supply also is expected to meet the needs of these people and private doctors and hospitals should provide adequate health care.

The conversion of JEA's Northside Units 1 and 2 is projected to require a peak work force of 600 people. This construction work force can be expected to result in an influx of about 290 people for Jacksonville/Duval County which is less than that for SJRPP. The resulting impacts should therefore be less than those expected for the proposed project. Based on this analysis, no adverse impacts to community services are anticipated from the actions proposed in Alternative 1. The refuse-powered facilities and the conversion of NGS Units 1 and 2 do not generate a population influx great enough to affect the level of services in any of the affected communities.

Alternative 2

The source of impacts to community services in this alternative is the conversion of Sanford Units 4 and 5. The conversion of the Sanford Units is projected to result in an influx of some 968 people during the construction phase of this conversion. Only the City of Sanford is expected to receive an influx great enough to affect community services. The 327 people projected to move into Sanford could affect the ability of Sanford to serve its new residents.

The Sanford/North Seminole County community would be required to supply an additional 20,768 gallons per day as a result of the influx occurring from the Sanford conversion. The principal water supply is the Floridan aquifer which has an estimated 300 mgd available for human use. The temporary demand of less than 21,000 gpd should be adequately met during the construction phase of this project. Similarly, the secondary waste treatment for the Sanford plant is designed to handle a maximum flow of 8 million gpd and should adequately handle the population influx.

Sanford currently has 51 sworn officers in the City's Police Department. The influx of 327 persons would not require the employment of any additional officers. Fire protection services provided by the City of Sanford include a fire fighting force of 39 with four engine companies, one ladder company, and two emergency rescue vehicles. The population influx will not require any additional fire fighting staff. In addition, health care services are currently operating at a vacancy rate which should easily accommodate the anticipated influx.

The enrollment projections for the Sanford area indicate little growth and even some decline over the next decade. The conversion of Sanford Units 4 and 5 may result in an influx of some 175 children into the Sanford schools. However, one new elementary school will be completed within five years and additional vacant pupil stations should exist from declining enrollments. It is projected that such an influx could be adequately absorbed by the education system (Ray 1981).

Seminole County has experienced a steady growth in housing over the past ten years and expects that growth to continue through 2000. Likewise, housing in the City of Sanford should also continue to grow although not at a rate as great as the County. Given the estimated 7.5% vacancy rate that occurred between 1970 and 1980, the Sanford area should have a sufficient number of housing units for the influx of people related to the construction phase. It is projected that about 1,950 multi-family housing units will be available in Sanford in 1985 (ECFRPC 1977). Even if most immigrant workers move into multi-family housing, the housing market should be able to adequately accommodate them.

Alternative 3

Under Alternative 3, impacts to community services would occur from the conversion of FP&L's Sanford Units 4 and 5 as well as from the construction of a smaller coal-fired plant in Jacksonville by JEA. The construction of this smaller coal-fired power plant is expected to require 579 construction workers which can be expected to result in an influx of about 277 people to Jacksonville/

Duval County. As with the immigrant population associated with the conversion of JEA's NGS Units 1 and 2, this influx represents a very small portion of the County's population. The alternative action is not expected to result in adverse impacts.

Alternative 4

This alternative includes impacts associated with the conversion of Sanford Units 4 and 5 and impacts to Jacksonville/Duval County as a result of converting JEA's Northside Unit 3 from oil-fired to coal-fired. The peak construction work force for converting the NGS Unit 3 is expected to be 750 resulting in an influx of 360 immigrants to Jacksonville/Duval County. Again, however, such an influx constitutes a relatively small portion of the population (less than 0.5%). The impacts of this influx are expected to be small and temporary.

The influx of 360 people should not significantly affect the water supply or wastewater treatment system of Jacksonville/Duval County. Such an influx demand should be adequately met by the projected excess service levels. The public safety system is projected to have a surplus of personnel and this projected surplus of Jacksonville/Duval County should provide adequate services for the construction influx. The school system should be able to absorb any additional students, although a few instructors may need to be added. The housing supply and health care facilities should meet any demands of this influx population.

Comparison of Impacts

The proposed project would generate the greatest influx of people associated with the construction of any of these alternatives. Because SJRPP results in more people immigrating to a single community, this project also means the greatest impacts to the services of any one area. Only the conversion of FP&L's Sanford Units 4 and 5 compares to the impacts of SJRPP.

The most vulnerable area of community services is often the educational system. While the physical facilities may be able to accomodate additional students, instructional staff may have to be added even for a very temporary influx of students. Nevertheless, all impacted communities are expected to meet the anticipated demands with additional staff requirements. The other community services are expected to adequately serve the influx associated with these projects. The water supply and wastewater treatment systems have been adequately planned to meet their future service needs so that the influx demand should not significantly affect their capabilities. Law enforcement personnel and fire fighting staff of each community should be sufficient to protect the influx and resident population. Housing and health care services also are expected to be sufficient for the demands made on each community.

4.9.3.2 Operation Impacts

This section identifies the impacts on community services from the operation phase of each alternative. The impacts are based on the peak operation work force and the associated population influx. While the life of the projects vary, most would last for at least 15 years.

No Action Alternative

The No Action Alternative would postpone any needed power facilities and consequently any influx of operation personnel. Services should remain at the levels projected for future baseline conditions.

SJRPP

The operation of SJRPP is expected to require a peak work force of 375 people which is expected to be maintained from 1987 through 2025. The influx of new residents generated by the operation of this plant is expected to be about 150 people. This influx constitutes a relatively small percentage of the future population projected for Jacksonville/Duval County (less than 0.5%). Because this influx is so small, no adverse impacts are expected to occur from the operation of SJRPP.

Alternative 1

The impacts of Alternative 1 would occur only from the operation of refuse-powered facilities. The conversion of JEA's Northside Unit 1 would not require any additional operating staff and therefore no new demands would be made on the community by an incoming population. The operation of the residential solar water systems should not lead to any significant impacts on community services and no impacts are expected from the power purchase or transmission lines.

Each refuse-powered facility is estimated to require 55 operational employees. This work force is projected to result in a maxmimum influx of 40 people to any of the associated counties. This influx would represent a very small portion of the population of any of the counties considered. Consequently, all services are expected to be adequate in meeting the needs of these new residents.

Alternative 2

The conversion of FP&L's Sanford Units 4 and 5 is expected to result in an influx of 49 people for the peak operation phase. In order to determine the greatest impacts, it is assumed that all 49 people will locate in Sanford. This figure represents less than 0.2% of Sanford's projected population. This small increase should result in no major demands on community facilities and services.

Alternative 3

Under Alternative 3, a population influx would occur in Sanford from the operation of Units 4 and 5 and in Jacksonville from the operation of the smaller JEA coal-fired power plant. This coal-fired plant is the distinctive aspect of this option and would mean that two specific communities would be affected.

The smaller coal-fired plant would require an operational work force of 95 employees. It is estimated, however, that only about 30-40 people would actually move into Jacksonville from other areas as a result of the operation of this plant. This influx would be a very small percentage of the projected population and is not expected to have any adverse impacts on Jacksonville/Duval County.

Alternative 4

The distinction of this alternative is the conversion of JEA's Northside Unit 3 to coal-fired power. The operation of JEA's NGS Unit 3 would require an additional work force of 100 employees. This additional work force would mean a maximum influx of 40 people to the Jacksonville area. Such an influx is a very small percentage of the projected population and should be adequately served by the community. No adverse impacts are expected to result from their immigration. Water supply, wastewater treatment, public safety, housing, education services, and health care should all be adequately provided.

Comparison of Impacts

None of the alternatives would result in significant impacts on community services. The influx of people associated with these operations are relatively small and none of the communities would experience significant changes in their service levels. Even the proposed action, which accounts for the greatest influx, would result in relatively few additional demands on Jacksonville/Duval County's ability to provide services.

4.10 IMPACTS ON LAND USE, RECREATION, AND AESTHETICS

This section describes the potential impacts of the proposed project and potential alternatives on land use, recreational resources, and aesthetic conditions. The analysis centers on changes in existing land use patterns, changes in current zoning, compliance with comprehensive land use plans, changes in recreational areas, and impacts on the aesthetic condition of surrounding areas. Each of these areas is considered according to the potential impacts resulting from the construction and operation phases of each alternative.

4.10.1 Construction Impacts

4.10.1.1 No Action Alternative

Under the No Action Alternative, there would be no construction of new facilities or conversion of any existing units. Existing land use consequently would not be altered, no zoning changes would be required, and future use of the land should occur as projected.

4.10.1.2 SJRPP

Construction of the proposed project is consistent with existing land use within a five mile radius of the proposed site. Along with existing industries in the area, the project would serve to strengthen the designation of port-related industry for this area. The site area is currently industrial in nature and these land uses are not expected to be altered as a result of plant construction. Current land use activities on-site include timber cultivation and limited hunting, however, and such activities would be precluded by construction of the proposed facility for at least the life of the project.

The site of the proposed project has been zoned IH for heavy industrial uses. On 24 February 1981, the Jacksonville City Council enacted Ordinance No. 80-1290-700 which rezones the land for the power plant to GU (Government Use) at such time as JEA acquires the fee simple title to the property. The ordinance also waives the height limitations and permits required under the Building, Electrical, and Plumbing Codes. Pursuant to Section 403.508 of the Florida Statutes, a Land Use and Zoning Hearing was held in order to take testimony regarding compliance of the proposed plant with local zoning and adopted comprehensive land use plans. This hearing was held 5 May 1981 and the Hearing Officer submitted a recommended order on 8 July 1981. A confirmatory determination has also been made by the Governor and his Cabinet regarding the proposed use of this site.

The proposed 1,656 acre site has been determined by the Jacksonville Planning Department to be consistent with the policies and land uses of the Land Use Element of the 2005 Comprehensive Plan. The Department determined that the proposed power plant facility would constitute an industry not necessarily requiring a waterfront location, but significantly dependent on the port or waterfront for conducting its business. It was determined that the proximity of the facility to an adequate source of cooling water and the proximity of the waterfront to the coal unloading facility constituted a significant, if not essential, factor in selecting and using the power plant site. The Department further found that their projections indicated that by the year 2005, ample lands designated for water-related industrial use would still be available.

According to the Jacksonville/Duval County Land Use Plan Map, a metropolitan recreational park is proposed on a portion of the site of the existing Northside Sanitary Landfill. Although some of this landfill site will be needed for the proposed project, there should be sufficient land on the remaining landfill area for the proposed park. In addition, some of the wetlands to be conserved on the project site adjacent to the landfill could be included in the park.

The coal unloading facility is planned to be located on a 55 acre site at the riverfront on the south side of Blount Island. This coal handling facility is an industrial use consistent with the Land Use Plan Map and Element. The 2005 Comprehensive Plan proposes all of Blount Island for water-related industrial uses.

Areas diverted to transmission line rights-of-way (ROW) can still be utilized for certain compatible land uses including: general agriculture; cultivation of nursery stock pine trees; parks; golf courses; equestrian or bicycle paths; picnic areas; game refuges; and hiking trail routes. It is possible that a part of existing corridors may also serve the new transmission lines. Transmission lines are not a land use specifically identified on the Land Use Plan Map or a permitted use within any of its land use classifications. The proposed project includes location proposals only for a broad corridor for the transmission lines and not a specific location of the line. The proposed corridor, however, largely follows an existing transmission line ROW.

By avoiding most areas of existing or planned medium or high density residential development, the preferred transmission corridors remain largely compatible with surrounding land uses. The preferred corridors are characterized mostly by natural upland vegetation. It is probable that the selected ROW will cross limited areas of medium residential development. Such crossings may result in the displacement of a small number of residences. These crossings will be avoided when possible.

The preferred corridor section to the Robinwood Substation includes a limited area of private recreation uses consisting of a golf course and tennis courts. It may be possible to avoid crossing portions of these recreation areas by using tower designs which decrease the right-of-way width necessary along with changing the tower location. However, it appears likely that one of these properties may be affected by the transmission line.

Railroad lines are not addressed separately in the Land Use Element and railroad rights-of-way also are not a defined use within the zoning code. The basic route of the railroad lines already exists so that no significant change would be involved if additional lines were needed for SJRPP. It should be noted that the railroad connection to Blount Island is owned by the Jacksonville Port Authority.

4.10.1.3 Alternative 1

Four counties in FP&L's service area are potential sites for the construction of refuse recovery and generation facilities. These counties include Seminole, Brevard, Manatee, and Sarasota. Only Duval County in JEA's service area is considered for the location of such a facility. For each facility, land is required for the plant and the ash disposal landfill. Depending on the size of the facility, the necessary land requirements vary (Table 4.10-1). Each site considered is located at existing landfills. These refuse-powered plants would result in a land saving due to the amount of refuse landfill avoided.

Table 4.10-1. Land requirements for refuse-powered facilities proposed in Alternative 1 (in acres).

	Ash Landfill	Plant	Total	Refuse Landfill Avoided
Duval County	28.0	13.5	41.5	165.3
Seminole County	4.7	2.3	7.0	44.9
Brevard County	11.1	5.4	16.5	105.4
Manatee County	5.9	2.9	8.8	56.0
Sarasota County	7.2	3.5	10.7	68.7

Because these facilities are to be located at existing landfills, they are expected to be consistent with land use patterns of the area and the comprehensive plan of each county. Since specific locations have not been identified, any necessary zoning changes are not known.

Recreational resources also are not expected to be significantly affected. A recreational park is proposed for the existing Northside Sanitary Landfill, but there should be sufficient land remaining to construct the park. The effects of constructing these facilities should have positive impacts on surrounding aesthetic conditions. The reduction in necessary refuse landfill areas should improve the aesthetic conditions of each area.

The conversion of JEA's Northside Units 1 and 3 is expected to require a total of 45.4 acres. Storage of the coal and oil mixture is expected to require 6.5 acres, the ash pond 13.9 acres, an ash landfill 24.8 acres, and ESP 0.20 acres. This conversion, however, will not significantly affect land uses in the area and the project is expected to be consistent with the Land Use Element of the 2005 Comprehensive Plan. Impacts to be project area should be less than those projected for SJRPP since the conversion is expected to occur on the existing NGS site.

Construction of the transmission lines will require the purchase of land for the corridor. While the specific land uses of these areas is not known, areas diverted to the transmission line right-of-way can still be used for certain compatible uses. Easements from the State will be required for the crossing of any State-owned land including those of river/stream bottoms. Some counties may require zoning changes.

Although specific impacts cannot be identified since exact transmission line corridors are not known, several general assessments can be made. Most construction of transmission lines should occur in rural, sparsely populated areas. Some residential areas, however, will be affected by the lines. Residents living in close proximity to the corridor may oppose the change of land use and may object to changes in aesthetic conditions of such areas. It is anticipated that the impacts associated with the transmission lines will be minimized wherever possible.

4.10.1.4 Alternative 2

Conversion of the Sanford Plant would require a significant increase in the land required for operation as a coal-fired plant. In addition to the conversion of these units, the construction of transmission lines from Georgia to central Florida would also affect surrounding areas (Section 3.1.3).

Land requirements for the Sanford Plant conversion result primarily from coal storage and handling, the air pollution control system, and ash handling and disposal. The larger increase would occur if NSPS emission controls are required because large quantities of FGD scrubber sludge would have to be disposed of. For coal delivery, the plant will require a new spur from the nearby SCL Railroad. The spur will require 2 to 3 miles of track to accommodate 100-car unit trains. A rail car unloading facility must be constructed as well as coal conveyors. The land necessary for various aspects of this conversion is identified below as distinguished by SIP and NSPS requirements:

Coal Pile:	16.01 acres (418,509 tons; average height of 20 feet)
Ash Pond:	32.79 acres

Table 4.10-2. Comparative analysis of construction impacts on land use, recreation, and aesthetics.

Alternative	Significant Changes in Land Use Patterns	Zoning Changes Required	Compliance with Comprehensive Plan	Impacts on Recreational Resources	Impacts on Aesthetics
No Action	None	None	-	None	None
SJRPP					
• Plant Site	None	IH to GU (ordinance enacted 2-24-81)	Yes	None	Visibility of landfills
• Blount Island Facility	None	None	Yes	None	Visibility of coal pile
• Transmission lines	Some possibility	None	Yes	Unknown	Reduction of certain natural areas
Alternative 1					
• Refuse-powered Facilities	Not expected	not expected	Yes	None	Reduced landfill areas
• Conversion of NGS Units 1 and 3	None	None	Yes	None	None
• Transmission Lines	Some possibility	Some possibility	Unknown	Unknown	Reduction of certain natural areas
Alternative 2					
• Sanford Plant Conversion	From agricultural to industrial	Special Exception must be obtained from Volusia Co.	Yes	None	Visibility of coal pile and landfills
• Transmission Lines	Some possibility	Some possibility	Unknown	Unknown	Reduction of certain natural areas
Alternative 3					
• Sanford Plant Conversion	From agricultural to industrial	Special Exception must be obtained	Yes	None	Visibility of coal pile and landfills
• Small coal-fired plant	None	IH to GU	Yes	None	Visibility of landfill
Alternative 4					
• Sanford Plant Conversion	From agricultural to industrial	Special Exception must be obtained	Yes	None	Visibility of coal pile and landfills
• Conversion of NGS Unit 3	None	IH to GU	Yes	None	Visibility of landfills

Ash Landfill:	(SIP)	57.37 acres
	(NSPS)	58.01 acres
Air Pollution Control:	(SIP)	ESP's - 0.77 acres
	(NSPS)	ESP's - 0.77 acres SO_2 modules - 1.03 acres FGD facilities - 1.18 acres FGD landfill - 103.76 acres (or a total of 106.74 acres)
Coal Unloading and Handling:		8 acres

Total Land Needed:

Sanford Coal (SIP):	114.94 acres
Sanford Coal (NSPS):	221.55 acres

Impacts of the Sanford conversion will occur from the land needed for the coal pile and the landfills for ash and sludge disposal. It is anticipated that the coal pile will be located on land currently owned by FP&L. The sludge landfills, the ash landfill, and some of the ash pond would require the purchase of additional land. Most of the land to be purchased is currently farmland and zoned for agricultural uses. The conversion to industrial use would require approval by Volusia County.

In order to convert these land uses, the County must issue a Special Exception for power generation uses in agricultural lands. Such a Special Exception was previously issued for an experimental FP&L conversion project, and the County would be expected to issue one for this action. Since much of the land in the vicinity, such as that along US Highway 17/92 and the SCL Railroad, has already been converted to industrial and commercial use, the conversion of this land is considered to be in compliance with the Volusia County Comprehensive Plan (Oshinski 1981).

The additional coal pile and landfills are expected to affect the aesthetic conditions of the surrounding areas. Depending upon the exact location of the sludge landfills, the residents of Meadowlea Estates could be affected by the sights and smells of the landfills. Barwick Road is expected to be extended to connect with Fort Florida Road. From this highway, the coal pile and two sludge landfills should be visible. The location of these landfills in close proximity to the residential area is expected to arouse a certain amount of public opposition.

No specific impacts are expected on the recreational resources of the area. Possible impacts could occur, however, from the proximity of the landfills to a local park and marina.

4.10.1.5 Alternative 3

Under this alternative, impacts on land uses, recreation, and aesthetics would result from the conversion of the Sanford Units 4 and 5 as discussed in Section 4.10.1.4 and from the construction of a smaller coal-fired power plant by JEA. The coal-fired power plant is projected to be approximately 75% smaller than the proposed SJRPP project. As in the case of SJRPP, this small power plant would be consistent with existing land uses and in compliance with the expected uses identified in the 2005 Comprehensive Plan. The project would serve to reinforce the future industrial development of the area. Impacts on aesthetic conditions and recreational resources would be similar to those of SJRPP (Section 4.10.1.2).

4.10.1.6 Alternative 4

The conversion of the NGS Unit 3 would require land for a coal pile, ash pond, ash landfill, and FGD sludge landfill. This proposal would require JEA to purchase additional land. The land requirements associated with this conversion are identified below as distinguished by SIP and NSPS limitations.

Coal Pile:	6.08 acres (159,090 tons; average height of 20 feet)
Ash Pond:	21 acres
Ash Landfill:	(SIP) 37.6 acres (NSPS) 38.0 acres
Air Pollution Control:	(SIP) ESP's - 0.23 acres (NSPS) ESP's - 0.23 acres SO_2 modules - 0.31 acres FGD facilities - 0.35 acres FGD landfill - 67.9 acres (or a total of 68.69 acres)
Coal unloading and handling:	3.0 acres

Total Land Needed:

NGS Unit 3 (SIP):	114.94 acres
NGS Unit 3 (NSPS):	221.55 acres

While the conversion of the NGS would require the purchase of additional land, the conversion of this land would be compatible with the land uses of the area and uses projected for this area in the 2005 Comprehensive Plan. The zoning classification would have to be changed to GU (Government Use), but the change is not expected to face significant opposition.

Impacts on aesthetic conditions may result from the coal pile and landfills. These areas most likely would not be visible from either Heckscher Drive or New Berlin Road, however. The municipal park proposed for the Northside Sanitary Landfill could be affected, but it is expected that sufficient land would remain for this proposed recreational resource.

4.10.1.7 Comparison of Impacts

None of the alternatives would result in major changes to future land use patterns, recreational resources, or aesthetic conditions. Table 4.10-2 summarizes the impacts of the various alternatives. The proposed SJRPP project is expected to reinforce land uses already existing in the project area and is consistent with the Jacksonville Comprehensive Plan.

Of the alternatives proposed, those including the conversion of FP&L's Sanford Units 4 and 5 would most likely have the greatest possibility of changing use patterns. The Sanford conversion would require the purchase of additional land by FP&L and would convert agricultural lands to industrial use. This conversion, however, occurs in an area which has mixed uses, parts of which are becoming more industrialized. The conversion would require Volusia County to issue a Special Exception, but such an action is not expected to be opposed.

The construction of the refuse-powered facilities should not affect land use patterns since the facilities are intended to be located at existing landfills. The conversion of NGS Units 1 and 3 should not require the purchase of additional land and therefore is expected to have few land use impacts. The conversion of NGS Unit 3 to coal-fired power would require additional acreage for the disposal of ash and sludge. This land is expected to be located on the proposed SJRPP site or near the existing Northside Sanitary Landfill, and while it would entail the conversion of currently natural areas, it is a use consistent with the surrounding area.

None of the proposed actions are expected to greatly affect recreational areas. The municipal park proposed for portions of the Northside Sanitary Landfill in Duval County should not be preempted by any of the proposed actions. Aesthetic conditions will be most affected by those alternatives incorporating coal piles and landfills. The visibility of the pile and landfill areas could become a concern to local residents. Only the Sanford Plant conversion proposes to locate such structures near residential areas. It is expected, however, that every effort will be made to locate these structures as far as possible from the residences.

4.10.2 Operation Impacts

The impacts of the various alternatives to land use patterns, recreational resources, and aesthetic conditions are expected to occur primarily from the construction of these various facilities. A minimal level of impacts is anticipated to occur from the operation phase.

4.10.2.1 No Action Alternative

Under the No Action Alternative, no changes would occur in existing or projected conditions.

4.10.2.2 SJRPP

Approximately 678 acres of land would be required for the operation of the proposed SJRPP project. This acreage is due in part to the need for waste holding/storage areas which are to be kept as small as possible by selling the gypsum by-product where marketable. Operation of the proposed plant should affect land use patterns by reinforcing current land use plans and trends. The proposed plant should not significantly affect land uses beyond a five mile radius. The operation of the plant may result in the development of secondary businesses. The location of such induced businesses, however, is not expected to change existing land use patterns. Employees needed to operate the plant may require additional housing, but this demand is not expected to be large. No impacts are expected to affect aesthetic conditions or recreational resources.

4.10.2.3 Alternative 1

The operation of the residential solar hot water systems, the converted NGS Units 1 and 3, the purchase of power, or the transmission of power is not expected to affect land use patterns, recreational resources, or aesthetic conditions. The refuse-powered facilities may bring in some operational employees which require new housing, but this demand should be relatively insignificant. Any induced businesses resulting from the refuse-powered facilities should likewise have relatively minor impacts on surrounding areas.

4.10.2.4 Alternative 2

The conversion of FP&L's Sanford Units 4 and 5 may result in the development of secondary businesses and some residential housing for operational employees. The land uses of the project area, however, include residential, commercial, and industrial uses and the induced development is not expected to generate adverse changes in land use patterns or recreational areas. Aesthetic conditions in the vicinity of the plant would be affected by the operation of the landfill areas.

4.10.2.5 Alternative 3

In addition to the minor operational impacts associated with conversion of the Sanford Plant, Alternative 3 includes the operation of the smaller JEA coal-fired power plant. This plant could result in the development of some secondary businesses and residential areas. This induced development should not generate significant changes to land use patterns, recreational resources, or aesthetics, however.

4.10.2.6 Alternative 4

Under this alternative, impacts could be realized from the conversion of the Sanford Plant and the conversion of the NGS Unit 3. The operation of the converted NGS Unit 3 should not result in many changes to existing areas. Some secondary businesses could be generated, but their development is not expected to result in any major changes to land use, recreation, or aesthetics.

4.10.2.7 Comparison of Impacts

The most important impacts to result from the operation of these actions would occur from induced secondary business development and residential housing development. Such developments may occur from the SJRPP project, the conversion of FP&L's Sanford Plant, the smaller JEA coal-fired power plant, or the operation of the refuse-powered facilities. The development associated with these projects is expected, however, to be compatible with the existing land use patterns and no major changes are anticipated to occur on the land use patterns, recreational resources, or aesthetics of surrounding areas.

4.11 IMPACTS ON TRANSPORTATION

This section describes the effects of the SJRPP and the alternatives on the transportation systems in the vicinity of the associated facilities. For purposes of this analysis, two study areas have been designated. Study Area 1 includes the transportation facilities that serve NGS, the proposed SJRPP site and Blount Island. Study Area 2 includes the transporation facilities that serve the Sanford Plant.

4.11.1 Construction Impacts

4.11.1.1 No Action

The No Action Alternative is for JEA to continue to burn oil in the electric generating plants. No construction impacts to transportation are associated with the No Action Alternative.

4.11.1.2 SJRPP

Impacts to transportation during the construction of the SJRPP would reach a maximum in 1985 when employment is at its peak. Ninety percent of the 2,575 employees are expected to arrive at the plant site between 7:00 and 8:00 a.m. The total traffic generated during this year compared to the capacity of the four roads leading to the site (Table 4.11-1) indicates that Main Street and Eastport Road will not exceed the desired level for urban design conditions (level of service C). However, both Heckscher Drive and New Berlin Road will be exceeding this level and congestion is expected, especially at the intersections along these roads. New Berlin Road is also expected to receive additional impacts related to truck damage to the road surface.

Under existing traffic conditions, all signalized locations and roadways in the area of the proposed site are operating smoothly with additional capacity available. The influx of the power plant construction force and the continued growth in this area will affect traffic conditions along these roadways. The most severe problem will occur at the intersection of New Berlin Road and Heckscher Drive, presently an intersection of two lane facilities. The turning traffic from Heckscher onto New Berlin is expected to significantly increase and will likely require the addition of a left turn lane on the west approach at this location. Other locations likely to require improvements are: Heckscher Drive/Main Street; Heckscher Drive/I-95 Spur; Main Street/Eastport Road; Eastport Road/Heckscher Drive; and Main Street/New Berlin Road.

4.11.1.3 Alternative 1

Conversion of NGS Units 1 and 3 to burn COM will result in increased construction work force traffic and increased equipment delivery truck traffic in the Jacksonville area. However, the increase will be on a smaller scale than that of the SJRPP. Table 4.11-2 depicts the existing traffic and projected 1985 traffic volumes for the affected roadways in Study Area 1. No roadways in Study Area 1 would be significantly affected by construction of the refuse plant or the COM conversion under Alternative 1. Implementation of Alternative 1 will have no effect on the transportation facilities in the Sanford area (Study Area 2).

Table 4.11-1. Existing and projected (1985) average daily and peak hour traffic volumes in the proposed site vicinity (Harland Bartholomew and Associates Inc. 1980 in JEA/FP&L 1981a).

	1980 Average Daily Traffic	1980 Peak Hour Volume	Projected 1985 Average Daily Traffic	Projected 1985 Peak Hour Volume/ Capacity (level of service C)
Heckscher Drive	10,265	835	16,136	2,753/2,600
Main Street	16,466	1,386	21,962	2,605/5,200
Eastport Road	7,591	615	10,459	1,276/2,000
New Berlin Road	1,636	159	5,781	1,972/1,800

ASSUMPTIONS:

10% Growth
1.2 Persons per car

GIVEN:

Construction Employment - 2,575 (1985 peak)
Construction Truck Traffic - 37,200 in 1985 (peak)
90% work 8:00 a.m. - 4:30 p.m.

Table 4.11-2. Existing and projected (1985) peak hours traffic volumes in Study Area 1 for construction of Alternatives 1, 3, and 4.

	1980 Peak Hour Traffic Volume/ Level of Service C Volumes	Projected 1985 Peak Hour Traffic Volume: Construction		
		Alt 1	Alt 3	Alt 4 NGS
Heckscher Drive	835/2,600	1,201	1,123	1,159
Main Street	1,386/5,200	1,993	1,864	1,924
Eastport Road	615/2,000	884	827	853
New Berlin Road	159/1,800	229	214	396

ASSUMPTIONS:

20% growth (1980-1985)
90% work between 8:00 a.m. and 4:30 p.m.
Traffic distributed proportionately to 1980 peak hour volumes

4.11.1.4 Alternative 2

Study Area 1 will experience the same effects from Alternative 2 as from the No Action Alternative. Conversion of Sanford Units 4 and 5 will increase traffic in Study Area 2 slightly (Table 4.11-3). Most of the additional construction work force and equipment delivery traffic will be carried by Interstate Highway 4 which presently has excess capacity available.

4.11.1.5 Alternative 3

The effects of Alternative 3 on Study Area 1 will result from the construction of the 280 MW power plant. Construction of this plant is essentially the same as constructing SJRPP except that the plant is one-fourth the size of the SJRPP and the Blount Island coal facility will not be built. Construction traffic will be correspondingly less (Table 4.11-2). The effects of Alternative 3 on Study Area 2 are identical to those of Alternative 2 (Table 4.11-3).

4.11.1.6 Alternative 4

In Study Area 1, increased traffic loads will result from the conversion of NGS Unit 3 to coal. More construction traffic will be generated than for the NGS COM conversion because 45 acres of land will have to be cleared for the ash pond, ash landfill, and coal pile (Table 4.11-2). The Blount Island facility will not be built for this alternative. The effects of Alternative 4 on Sanford Area 2 would be identical to those of Alternatives 2 and 3 (Table 4.11-3).

4.11.2 Operational Impacts

4.11.2.1 No Action

Under No Action, the impact to transportation systems in Study Area 1 would be a 2% per year increase in traffic volumes (predicted by the Jacksonville Planning Board) as industrial expansion in the area continues. The No Action Alternative would result in a general increase in traffic volumes in Study Area 2.

4.11.2.2 SJRPP

Although plant operation will increase local traffic volumes, this increase will be greatly reduced from the construction phase. Plant operation will require approximately 375 employees, 90% of whom are expected to be assigned to the day shift. Approximately 280 vehicles will be added to current traffic volumes during the morning shift arrival. Local roads are easily capable of accommodating this traffic increase.

The effects of coal trains entering and leaving the plant site would be the most significant traffic impact during plant operation. To estimate this impact, worst case delay times created by plant-related coal train traffic along Heckscher Drive, Main Street, and Eastport Road were computed. This analysis assumed that local trains would operate during peak traffic hours. The total daily vehicle delay (i.e., The number of vehicles delayed times the delay time) for the crossing of Main Street at Eastport Road by coal trains supplying the proposed plant was estimated to be approximately 128,300 seconds

Table 4.11-3. Existing and projected (1985) peak hour traffic volumes for the alternatives affecting Study Area 2 (the Sanford Plant).

	1980 Average Annual Daily Traffic	1980 Peak Hour Traffic	Projected 1985 Peak Hour Traffic[a] Alts. 2,3,&4
U.S. Highway 17/92	6090	456	567
Interstate Highway 4	24,834	1,860	2,312

ASSUMPTIONS:

1.2 persons per car

K factor = 8% for US 17/92
7% for Interstate 4

7% growth (1980-1985)[b]

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[a] Includes constructions worker traffic proportioned between the two roads; construction truck traffic volumes are not available.

[b] (ECFRPC 1977)

per day with the longest anticipated single delay of 1.5 minutes. This would equal a total annual social cost of about $106,000 (total annual delay times minimum wage).

Trains will cross Eastport Road at two points (near Main Street and also where Eastport Road turns south toward Heckscher Drive). The total daily vehicle delay for Eastport Road is projected to be 6,678 seconds with a longest anticipated single delay of 1.5 minutes which would equate to a total annual social cost of $50,555.

Coal trains arriving at the plant from the Blount Island coal unloading facility will cross Heckscher Drive near the NGS. Two scenarios were considered for delay time calculations. The first scenario assumed that all the coal for the plant would be shipped by barge. The second scenario assumed that one-half of the SJRPP yearly coal requirements would be provided by barge. In the first case, delay would be approximately 7,100 seconds per day with a longest anticipated single delay of 9.5 minutes. This would result in a total annual social cost of about $7,800. Delay for the second scenario would be approximately 14,200 seconds per day and 19.1 minutes for the longest anticipated delay. This would equal a total annual social cost of $15,600.

4.11.2.3 Alternative 1

Operation of the converted NGS Units 1 and 3 will result in 80 additional workers and 60 additional peak hour vehicles. It is assumed that the COM will be delivered by truck from two independent COM producers to be located on Blount Island. In order to deliver adequate supplies of COM, 75 tanker trucks will be used per day.

Only 55 personnel will be required to operate the refuse-fired plant, which will result in 41 additional peak hour vehicles. This is not enough additional traffic to create any congestion problems in the vicinity of the plants. Refuse delivery truck traffic may increase if refuse is diverted from other landfills in the Jacksonville area to the RFPP. Alternative 1 would have no effect on transportation facilities in the Sanford area (Study Area 2).

4.11.2.4 Alternative 2

Operation-related impacts of Alternative 2 on transportation in Study Area 1 would be identical to those under the No Action Alternative. Operation of the Sanford Plant after coal conversion would require 76 additional workers and 57 additional peak hour vehicles which will not affect traffic volumes in the area. Delivery of coal to the site would increase rail traffic in Study Area 2 by two trains every three days. However, since no traffic data for the Sanford area were made available, the potential impacts of this increase cannot be assessed at this time.

4.11.2.5 Alternative 3

The operation of the 280 MW plant will require 95 additional personnel and 71 additional peak hour vehicles which will not significantly affect traffic in Study Area 1. The effects of Alternative 3 on transportation in Study Area 2 would be identical to those of Alternative 2.

4.11.2.6 Alternative 4

Operation of NGS after coal conversion would require 100 additional personnel and 75 additional vehicles and consequently would have a negligible effect on traffic in Study Area 1. Delivery of coal to the plant by truck would cause delays at Main Street and Eastport Road.

4.11.3 Comparison of Impacts

Transporation impacts under any of the four alternatives would be less severe for the Study Area 1 as compared to the proposed project. From a transportation standpoint, the SJRPP/NGS study area is compatible with development under any of the alternatives due to the comparatively small increase in traffic that each would generate. Alternatives 3 and 4 would cause the greatest impact of all the alternatives (except SJRPP) because they would employ a large number of workers and require the highest volumes of coal train traffic. The refuse-fired power plant and the COM conversion at the NGS under Alternative 1 would produce negligible increases in traffic in the Jacksonville area.

Transportation patterns in Study Area 2 would be affected by the conversion of Sanford Units 4 and 5 as outlined for Alternatives 2, 3, and 4. However, is not expected that any adverse transportation impacts would occur under these alternatives because little traffic would be added to that presently attributed to the Sanford Plant.

In summary, none of the four alternatives should cause adverse operation-related impact on transportation patterns. In contrast, the traffic delays cause by coal train deliveries at the SJRPP would constitute adverse social and economic impacts.

4.12 ENERGY IMPACTS

4.12.1 Construction Impacts

Energy will be consumed in the construction phases of all alternatives. Construction of transmission lines and the construction and installation of residential solar hot water systems will also consume energy. Most of the energy consumed will be petroleum-based energy used to fuel construction vehicles. Electricity would also be consumed during construction, most of which would be produced using oil-fired plants. It is assumed that construction-related impacts of the alternatives on energy resources are related to the magnitude of the construction activities involved.

4.12.2 Operation Impacts

4.12.2.1 No Action

Under the No Action Alternative, JEA and FP&L will continue to burn oil in boilers in order to generate electricity. For the short-term, the high cost of oil and the insecurity inherent in the importation of foreign oil would continue to burden FP&L and JEA electrical energy consumers.

In the long-term, the electrical energy reserves of the utilities would decrease. Use of relatively scarce and expensive boiler fuels such as natural gas would continue. In order to meet future demands and to lower the cost of electricity to their customers, both JEA and FP&L would be required to construct other generating facilities, procure power from other sources, institute conservation measures, or cut back on energy consumption. The latter option would curtail economic growth in both service areas.

4.12.2.2 SJRPP

The proposed project will increase the bulk supply of electricity to the JEA and FP&L systems by a net amount of 550 MW each. This would satisfy JEA's future power needs at a competitive cost (Appendix BB) well into the 1990's, but would meet FP&L's future power needs for only about 1 year at the current rate of growth (Bivans 1981). In addition, the fuel mix for these two systems will be diversified to include coal, a more abundant and less expensive fuel. Energy will be consumed in the operation of the proposed facilities and in mining and transporting 3,500,000 tons of coal per year from Kentucky or Tennessee to the plant. The process of burning coal to produce electrical energy is a medium efficiency process. Considerable amounts of energy are lost in the process as waste heat and in the conversion of thermal energy to mechanical energy and then to electrical energy.

Plant consumption of electrical energy also includes such energy intensive systems as the FGD system and ESP's and accounts for some of the difference in the 1,200 MW rating and its estimated net output of 1,100 MW.

4.12.2.3 Alternative 1

The refuse plants, residential solar water heating units, and purchase of electrical energy from a Georgia Power's Plant Vogtle would provide 228.4 MW of additional generating capacity to the JEA system and 550 MW to the FP&L system without requiring long distance transport of fuels. This alternative would meet approximately one half of the power needs projected by JEA and all of the power needs for FP&L that the SJRPP was designed to supply. However, the relative cost of generating this additional power would be high, even more for FP&L than continuing to burn oil (Appendix BB). The conversion of NGS to a coal-oil mixture will reduce generating capacity at the NGS by 152 MW which would have to be made up by the purchase of power. The basic fuels making up the coal-oil mixture will be transported over long distances to the NGS site. Power generated at Plant Vogtle would be transmitted to Florida at an efficiency of about 97%. Refuse plants will make use of materials that normally would be discarded; hence, refuse plants represent a method of recycling these materials to generate electricity and reduce the bulk of material to be landfilled. There is a loss of energy associated with the conversion of thermal energy for this process. The solar water heaters make use of a virtually limitless renewable resource. Due to variability in the weather, however, these systems require a backup energy source such as natural gas or electricity in order to provide a reliable source of hot water.

4.12.2.4 Alternative 2

Under Alternative 2, 550 MW of additional capacity would be purchased from Plant Vogtle for JEA. Conversion of FP&L's Sanford Plant reduces generating capacity and 72 MW of power would be purchased to makeup for this derating. This alternative would meet JEA's future capacity needs and displace oil at a competitive cost to that provided by SJRPP. However, FP&L would gain no capacity and would have to begin making plans to meet its projected need for additional capacity in 1989. The Sanford Plant conversion to coal would meet FP&L's need to displace oil, but would increase the need for power during conversion to replace the power normally supplied by Sanford Units 4 and 5. Energy would be required to transport the coal, a bulkier fuel then oil, from the coal fields to Florida. Also about 10% of Sanford Units 4 and 5 generating capacity would be lost due to derating and about 3% of the power purchased from Plant Vogtle would be lost in transmission.

4.12.2.5 Alternative 3

Impacts as the result of the purchase of power and the conversion to coal of FP&L's Sanford Plant were described in Section 4.11.2.3. The small 280 MW coal-fired power plant on the site of the proposed project will have impacts similar to the proposed project on the energy resources, but would be reduced in magnitude. As in the case of Alternative 2, JEA would be able to meet the projected capacity needs for which the proposed project was designed, but FP&L would not. Both utilities would reduce the use of oil as a boiler fuel in favor of coal, a more abundant resource.

4.12.2.6 Alternative 4

The purchase of power and the Sanford Plant conversion to coal were discussed in Section 4.12.2.3. NGS Unit 3 would be derated by 46% as a result of conversion to coal firing and the loss in capacity would be made up by purchase of power to prevent a loss of regional supplies of electric energy. Energy impacts related to fuel transportation would be increased since coal would have to be transported over long distances to supply both the NGS and Sanford Plants. This alternative would supply 72 MW of additional capacity to JEA and none to FP&L. As in the case of Alternatives 2 and 3, the utilities would have to begin planning other means to meet future capacity and reliability needs.

4.12.2.7 Summary of Operation-Related Impacts

The proposed project and each of the four alternatives will reduce the amount of oil used in generating electricity in the JEA and/or FP&L systems. Only the proposed project and Alternative 1 provide additional generating capacity for the FP&L system. Additional energy would be provided for JEA in all alternatives (Table 4.12-1).

Alternatives 2, 3, and 4 allow for the greatest reduction in oil consumption in generating electrical energy due to the conversion of Sanford Units 4 and 5. The proposed project and each alternative provide for the same reduction in oil consumption in the JEA system. The proposed project and Alternative 1 allow for an increase in FP&L's electrical generating capacity; other alternatives do not. If Alternatives 2, 3, or 4 were selected, FP&L would have to begin making plans for other facilities or means of obtaining additional capacity in order to meet its projected needs.

Table 4.12-1. Oil displacement and electrical generation capacity additions to the JEA and FP&L systems for the proposed project and each alternative.

	Barrels of Oil Displaced ($x\ 10^3$ barrels)		Additional Generating Capacity (MW)	
	JEA	FP&L	JEA	FP&L
No Action	0	0	0	0
SJRPP	5,875	5,440	550	550
Alternative 1	5,875	5,440	228.4	550
Alternative 2	5,875	7,200	550	0
Alternative 3	5,875	7,200	550	0
Alternative 4	5,875	7,200	72	0

Under the proposed project, oil is displaced by increasing the use of coal. Alternative 1 provides oil displacement through increased used of coal, alternative fuel sources, and purchased nuclear power. Solar energy and refuse combustion provide additional capacity and displace oil, while making use of recycled materials or renewable and limitless fuel sources. Alternatives 2, 3, and 4 provide additional capacity with purchased power and displaced oil through the conversion of oil-fired plants to coal or a coal-oil mixture. Purchased power does not involve the transport of primary fuels to a power plant; however, electrical energy must be transmitted over an expanded transmission line system. Of all options discussed, only coal-fired and COM-fired power plants require long distance fuel transport.

4.13 HUMAN HEALTH IMPACTS

The potential for human health impacts from the proposed project and the alternatives are summarized in this section. Principle concerns with respect to human health include air emissions and wastewater discharges. The no-action alternative would have no net effect on the human health impacts in the Jacksonville area. A more detailed discussion on human health is presented in Appendix V.

4.13.1 Proposed Project

4.13.1.1 Air Emissions

The air quality impacts on human health due to the operation of the proposed project are assessed for the criteria pollutants (those for which national standards have been developed) and non-criteria pollutants (those for which no standards exist), and radionuclides.

Criteria Pollutants

Criteria pollutants are those pollutants for which National Ambient Air Quality Standards (NAAQS) have been determined. The primary NAAQS are man-dated by the Clean Air Act for protection of public health with an adequate margin of safety. Pollutants currently having a (NAAQS) are sulfur dioxide (SO_2), nitrogen oxides (NOx), carbon monoxide (CO), particulates, hydrocarbons (HC), lead, and ozone. Because the proposed project will increase the net emissions of these pollutants in the Jacksonville area, ground level concentrations and human exposure to these pollutants will increase. However, ambient concentrations resulting from emissions from the proposed project and all major sources in Duval County would not violate any of the NAAQS (Section 4.2). A potential violation of the 24-hour FAAQS for SO_2 was predicted by FDER (see Appendix K or Section 4.2 of the SAR/EIS). If this violation were to occur there would be a short-term increase in the potential health risks for elderly persons and persons with acute and chronic respiratory disorders in the vicinity of the violation. Operational changes in the JEA system which are being considered to mitigate this impact include shutting down JEA's Southside Units 1 and 2 during peak load conditions. FDER has not yet determined the adequacy of the proposed change to mitigate the predicted violation. However, if the violation can be mitigated no further adverse health impacts would be expected to occur. It should be noted that the 24-hour SO_2FAAQS is more stringent than the NAAQS and that no violations of the NAAQS were modelled under any scenarios.

Possible impacts due to lead emissions were not modelled as part of the original air quality assessment (JEA/FP&L 1981a). Lead emissions from the proposed facility are projected to be 5.94 g/sec (JEA/FP&L 1981a). The short term ground level concentration for lead can be estimated by ratioing the lead emissions with those for SO_2 and in turn ratioing the ground level concentrations. Using this method, the maximum 24-hour lead concentration due to the emissions from SJRPP would be 1.08 ug/m^3 which would occur 1.8 Km slightly south of east from the facility. The NAAQS for lead is 1.5 ug/m^3 averaged over a 90 day period. Since the predicted 1.08 ug/m^3 is for a 24-hour period under 100% load, it would represent a significant overprediction of the 90 day average concentration. No ambient air data for lead is available in the vicinity of the project site; however, data are available for the downtown area of Jacksonville (USEPA 1981). Two sets of data are available corresponding to a downtown commercial district and a downtown residential neighborhood. The maximum and mean 24-hour concentrations of lead measured in the commercial district were 2.72 ug/m^3 and 0.89 ug/m^3 respectively. The maximum and mean 24-hour concentrations measured at the neighborhood monitors were 1.74 ug/m^3 and 0.47 ug/m^3 respectively. In both cases only the maximum valves exceed the NAAQS of 1.5 ug/m^3; however, the averaging time is different and a violation is not necessarily indicated. Lead concentrations are significantly affected by motor vehicle emissions. This probably accounts for the large change in lead concentrations from the downtown commercial to the downtown residential area. Because of the transportation factor, the ambient concentrations measured downtown would not be considered representative of the proposed project site. Assuming that the mean downtown residential concentration of lead is more representative of the SJRPP area, the maximum uncontrolled ground level concentration of lead from the SJRPP would increase concentrations to approximately 1.55 ug/m^3 near the site. This would be only a short term increase based on extremely conservative emission assumptions. Therefore, health impacts due to emissions of lead from SJRPP appear to be low. In addition, with respect to criteria pollutants in Jacksonville, there may be a general improvement as a result of the operation of SJRPP since it would displace emissions from the oil-fired Southside and Kennedy units which are located in the downtown area.

The proposed project would cause a reduction in air emissions in the FP&L system service area. Since a reduction in emissions may be assumed to improve air quality, there would be a net improvement in human health in the FP&L service area as a result of the proposed project.

Non-Criteria Pollutants

The SJRPP would also produce emissions of several non-criteria pollutants. These include trace elements, sulfates, and nitrates. A literature review of the potential effects of elevated levels of these trace pollutants on human health is presented in Appendix V. This section analyzes the potential health-related impacts of the non-criteria pollutants generated by the SJRPP using a worst-case scenario approach. The worst-case scenario is extremely conservative and assumes that all trace elements present in coal burned at SJRPP would be emitted through the SJRPP stacks (i.e., it is assumed the FGD, ESP and bottom ash will collect none of these emissions). Because of the nature of most trace elements (particulates), it is likely that the ESP will remove a large percentage of these elements. Also, a portion of those substances will be retained in the bottom ash (i.e. all mass will not be emitted into the atmosphere). Potential health impacts of trace elements are analyzed in this section by application of the Threshold Limit Value (TLV). Threshold Limit Values for several trace metals have been established by the American Conference of Government Industrial Hygienists. The TLV's represent concentrations under which it is believed that nearly all workers may be repeatedly exposed without adverse effects. These values (TLV) do not provide an indicator of constant exposure (ambient) so a human threshold limit value (HTLV) is derived by dividing the TLV by 100. This provides a value for comparison with ambient air values. Further discussion of TLV's and HTLV's is provided is Appendix V.

The maximum 24-hour ground level concentration of the trace elements emitted from SJRPP were estimated by comparing the emissions of the trace elements to the SO_2 emissions and comparing those with the ground level SO_2 concentrations predicted. This provides a very conservative number for comparison with the HTLV values because the concentrations would be a short term maximum rather than the long term average. However, if this methodology does not produce an exceedance of the HTLV, it can be reasonably concluded that the potential for human health impacts from trace element emissions as a result of the operation of SJRPP would be small. Table 4.13-1 depicts the trace elements assessed, their emissions, predicted increase in 24-hour maximum ground level concentrations, and the HTLV. Background concentrations of various trace pollutants at several locations in the Jacksonville area are shown in Table 4.13-2. There are no ambient data for the exact area of maximum concentration considered in Table 4.13-1. Only the increase in the concentration of beryllium is predicted to exceed the applicable HTLV. This exceedance is approximately 0.004 ug/m^3. As shown in Table 4.13-2, the ambient concentrations of beryllium in Jacksonville and at the SJRPP site are extremely low. Because of the small exceedance, the conservative analysis and the low background levels the actual potential for human health impacts due to beryllium appears to be low.

Table 4.13-1. Worst case analysis of trace element emissions and potential for adverse health effects due to SJRPP.

Trace Elements	Concentration[a] in Coal (ppm)	Projected Uncontrolled Stack Emission Rate[b] (gm/sec)	Projected Stack Emission Rate[c] (lb/hr)	Maximum Worst Case Trace Element Concentration Increase[d] (ng/m^3)	Human Health Threshold Limit Values (TLV divided by 100)[g] (ug/m^3)
Arsenic	25	2.52	19.96	0.4600	5.0
Beryllium	1.3	1.31×10^{-1}	1.04	0.0240	0.02
Boron	42	4.23	33.50	0.7670	100
Cadmium	0.24	2.42×10^{-2}	0.19	0.0040	0.5
Chromium	20	2.02	16.00	0.3660	1.0
Cobalt	9.8	9.88×10^{-1}	7.82	0.1790	-
Copper	18	1.81	14.34	0.3280	2.0
Fluorine	89	8.97	71.04	1.6270	2.0
Manganese	18	1.81	14.34	0.3280	5.0
Mercury	0.2	2.02×10^{-2}	0.16	0.0040	0.1
Molybdenum	4.6	4.64×10^{-1}	3.67	0.0840	-
Nickel	15	3.02	23.92	0.5480	10.0
Selenium	4.0	4.03×10^{-1}	3.19	0.0730	2.0
Strontium	130	13.10	103.75	2.3760	-
Tin	2.0	2.02×10^{-1}	1.60	0.0370	-
Vanadium	38	3.83	30.33	0.6950	1.0
Zinc	25	2.52	19.96	0.4570	-
Sulfate	-	57.03	451.70	10.3440	-
Nitrate	-	44.91	355.70	8.1450	-

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[a] Source: Gluskoter et al. (1977) in JEA/FP&L (1981).

[b] Based on coal consumption rate of 3.5×10^6 tons/year. Sulfate and nitrate emissions estimated to be 5% of SO_2 and NO_2 emissions.

[c] SO_2 emission rate of 1138.3 g/sec = 9034 lb/hr.

[d] Based on maximum predicted ambient SO_2 concentrations of 220 ug/m^3 on a 24-hour basis, which is contribution of proposed plant without any of the additional emission sources, assuming that all emissions are unaffected by FGD and electrostatic precipitator systems, and all trace elements in the coal are emitted through the stacks.

[e] Source: USEPA (1981); maximum 24-hour value observed on a single occasion in downtown Jacksonville.

[f] Source: JEA/FP&L (1981); measured at the SJRPP site.

[g] See Section 2.3.8.

Table 4.13-2. Comparison of ambient atmospheric trace pollutant concentrations for three areas in the vicinity of Jacksonville, Florida and human health threshold criteria in ug/m^3 (USEPA 1981) (JEA/FP&L 1981a).

Pollutant	Downtown Commercial District (max/mean in ug/m^3)	Center City Residential Neighborhood (max/mean in ug/m^3)	SJRPP Site (max/mean in ug/m^3)	Human Health Threshold Limit Values (TLV's divided by 100) (in ug/m^3)
Beryllium	0.0005/0.0003	0.0003/0.0002	<0.003/<0.003	0.02
Barium	0.135/0.027	0.539/0.485	-	5.0
Cadmium	0.002/0.001	0.004/0.001	0.0024/0.0009	0.50
Coppper	0.13/0.08	1.43/0.57	-	2.0
Iron	3.03/0.92	1.57/0.38	-	-
Manganese	0.22/0.03	0.10/0.02	-	5.0
Molybdenum	0.011/0.002	0.0086/0.0013	-	-
Nickel	0.070/0.018	0.067/0.023	-	10.0
Vanadium	0.154/0.043	0.121/0.027	-	1.0
Zinc	0.182/0.105	0.434/0.0067	-	-
Nitrate	4.69/2.57	4.61/ -	0.34/0.17	-
Sulfate	17.6/9.6	22.3/ -	19.1/10.7	-
Chloride	-	-	2.49/0.85	-
Arsenic	-	-	<0.002/<0.002	5.0
Mercury	-	-	0.003/0.0009	0.10
Selenium	-	-	<0.0005/<0.0005	2.0
Asbestos	-	-	ND/ND	-
Fluoride	-	-	0.5/0.15	-

Radionuclides

Radionuclides (radioactive isotopes from decay of radioactive elements) are found in coal and will be emitted during operation of the proposed facilities. Coal contains at least 50% carbon by weight as well as sulfur, iron, moisture, and trace quantities of naturally occurring radioactive materials such as uranium (U-235, U-238), thorium (TH-232), their decay products, and potassium-40. When coal is burned, the mineral content of the coal is converted to ash and slag. These waste materials contain most of the radionuclides originally present in the coal. A fraction of the ash is released to the atmosphere, and the remainder is collected and either re-utilized or landfilled. Appendix V provides a more detailed analysis of potential health related impacts of radioactive emissions. Due to the extremely small amounts of radioactive materials emitted in comparison to background levels, no adverse impacts due to the operation of the SJRPP would result.

4.13.1.2 Wastewater Discharges

The potential health-related impacts from water discharges would be related to bioaccumulation of some of the pollutants in fish and other marine life. The proposed project would discharge cooling tower blowdown and heated wastewater to the St. Johns River. The net change in bulk pollutant loadings which reflect the increase or decrease in loadings from the existing conditions are shown in Table 4.3-5. The proposed project would result in net increases in loadings of oil and grease, copper, iron, mercury, aluminum, and silver, and net reductions in loadings of chlorine and heat to surface waters. The increases would result in average and maximum concentrations which will occasionally exceed Class II water quality criteria for copper, cyanide, iron, mercury, silver, aluminum (maximum only), and oil and grease (maximum only). The SJRPP could exacerbate existing conditions by exposing increasing numbers of food chain organisms to elevated levels of trace metals within the mixing zone. However, it is not possible to accurately predict the exact nature of the potential human health effects of these increases in levels of trace metals in the lower part of the estuarine food chain.

The proposed coal unloading facility at Blount Island would also add trace elements to the St. Johns River. These materials would be transported to the River by seepage from the percolation pond and could exceed the Class III water quality standard for copper, iron, selenium, and mercury after mixing. The potential health problems are again related to bioaccumulation of mercury and copper in fish and other marine life, but are difficult to accurately define.

4.13.1.3 Other Vectors

There is an potential for leachate from the solid waste disposal cells on the SJRPP site to contaminate the water table aquifer and, to a lesser extent, the shallow rock aquifer. Due to the high permeability and low cation exchange capacity of the soils on the site, metals and other trace pollutants in the leachate would enter the water table aquifer and probably be transported down-gradient to Browns Creek and Clapboard Creek. There are no wells in the vicinity of SJRPP which utilize the shallow aquifer so the potential for direct impact on human health is low. Because of a discontinuous separation between the water table aquifer and the shallow rock aquifer in the area, there is also a potential for some of the leachate to reach the shallow rock aquifer. Although the leachate would be highly diluted, there is a possibility that some of the pollutants in the leachate could be picked up in low concentrations by wells using the shallow rock aquifer near the SJRPP. Therefore, there is some remote, long term potential for human health impacts due to leachate contamination of groundwater supplies.

4.13.2 Impacts of Alternatives

A detailed assessment of net changes in air emissions, water discharges, and solid waste generation has been provided in other Appendices. The assessment includes an evaluation of the proposed project and four alternatives. A brief statement as to potentially adverse or beneficial nature of each alternative with respect to human health is provided in this section. The analysis is based on the assumption that when pollutants entering the environment show a net increase, human health is adversely affected. Only comparative health impacts among the alternatives are presented. Absolute estimates of increased deaths and illnesses are not possible due to the lack of detailed information.

4.13.2.1 Air Emissions

There is widespread agreement that a general degradation of air quality can be associated with an increase in morbity and mortality. Moreover, there is no argument that the risks are extremely variable and that the young, the elderly, and the infirmed are the most susceptible groups. Of the four proposed alternatives, Alternative 1 would have the greatest potential for adverse impacts on air quality and, consequently, human health of the Jacksonville area. Alternative 1 would result in net increase in emissions of SO_2, particulates, NOx, CO, HC, and hydrochloric acid (Table 4.2-17). These increases are due to conversion of Northside #1 and #3 from burning oil to coal and addition of a refuse-fired power plant. Relative to the proposed project, Alternative 1 could result in greater health impacts because of larger increases in concentrations of SO_2, particulates, CO, and trace elements. Alternatives 2, 3, and 4 could improve human health conditions because of a decrease in air emissions in the Jacksonville area.

Human health could benefit from Alternatives 2, 3, and 4 in the FP&L service area outside of Sanford. Under these alternatives, human health could be affected in Sanford due to net increases in air emissions of SO_2, NOx, CO, HC, and trace elements. The health effects due to SO_2 would be greatly reduced if the conversion to coal of FP&L's Sanford facility includes an FGD system to meet NSPS standards. Relative to the proposed project, Alternatives 2, 3, and 4 could potentially result in greater adverse health impacts due to relatively higher net air emissions in the Sanford area.

Human health could be adversely affected in the FP&L service area and outside Sanford because of increased emissions of CO, HC, and hydrochloric acid from proposed refuse plants.

4.13.2.2 Wastewater Discharges

Of the four proposed alternatives, Alternatives 1, 3, and 4 would increase the net bulk discharges of copper, iron, mercury, aluminum, silver, and oil and grease to the surface waters of Jacksonville. Relative to the proposed project, the increases are small and thus the adverse health impacts would be less than those for the proposed project.

Alternatives 2, 3, and 4 would increase the net mass loading of copper, iron, mercury, aluminum, silver, and oil and grease to St. Johns River near Sanford. These discharges, however, would not be expected to cause violations of the water quality criteria for mercury, iron, aluminum, and silver. They should not therefore pose a threat to the public health. However, the discharge of copper could aggravate existing water quality problems since this parameter occasionally exceeds the State standards.

4.13.2.3 Other Vectors

None of the alternatives include unlined solid waste disposal facilities. Solid waste landfills were assumed to be lined in all alternatives. No adverse health affects due to leachates from solid waste disposal areas are therefore expected.

5.0 SUMMARY OF POTENTIAL ADVERSE IMPACTS OF THE PROPOSED PROJECT AND APPLICABLE MITIGATIVE MEASURES

This chapter summarizes the potential adverse impacts which could result from the proposed project (SJRPP) (Section 5.1) and appropriate measures which are available to mitigate these impacts (Section 5.2). Sections 5.3, 5.4, and 5.5 summarize unavoidable adverse impacts, effects of the project on short- and long-term productivity, and those resources which would be permanently committed by implementation of the proposed project.

5.1 SUMMARY OF ADVERSE IMPACTS

This section summarizes the adverse impacts which could result from the construction and operation phases of the SJRPP. Included are summaries of adverse impacts which could affect air, water, earth, biological, economic, cultural, and human resources in the project area.

5.1.1 Air Resources

The operation of the SJRPP could result in a violation of the 24-hour Florida Ambient Air Quality Standard (FAAQS) for sulfur dioxide. This potential impact was identified through modeling performed by FDER and would result primarily due to the cumulative emissions from the SJRPP, NGS, and the Kennedy and Southside Stations. Concentrations of other criteria pollutants would increase in the Jacksonville area due to the operation of the SJRPP. However, no other violations of the FAAQS or NAAQS are predicted to occur as a result of the operation of the SJRPP.

5.1.2 Surface Water Resources

Adverse impacts from the proposed SJRPP project would result from the discharge of trace elements, oil and grease, chlorine, and other oxidants (TRO) into the Blount Island Channel by way of the NGS discharge. Ambient concentrations of copper, cyanide, iron, mercury, silver, aluminum (maximum only), and oil and grease (maximum only), already exceed Florida Class III water quality criteria with varying degrees of frequency. The discharge from the SJRPP would exacerbate the situation and could increase the frequency and degree of water quality criteria violations. Additional adverse impacts would occur as the result of the movement of trace elements, especially iron, copper, mercury, selenium, arsenic, and zinc, through the coal unloading facility's percolation pond into the Fulton-Dame Point Cutoff. Leachate from the unlined sediment ponds, the solid waste landfill, and from the construction sedimentation ponds would likely seep into Browns Creek. Each of these receiving bodies of water will be degraded by these discharges and seeps.

5.1.3 Groundwater

Groundwater underlying the SJRPP would be impacted by drawdown, chloride intrusion, and by leachate seepage. During construction some drawdown of the shallow aquifer system is expected during dewatering for the coal and limestone unloader pit. During operation, drawdown of the Floridan Aquifer is expected during average and maximum usage. Average usage by SJRPP has been shown to create a cone of depression with 15 feet of drawdown at the nearest site boundary and approximately 9 feet of drawdown at the nearest off-site well. Approximately 66 Floridan Aquifer wells could experience declines of 2 to 4 feet and approximately 137 wells could experience drawdowns of 1 to 2 feet. Under maximum usage conditions for a 24-hour period, it was shown that the cone of depression at the site boundary was 25 feet with a drawdown of 14 feet at the nearest off-site well. Approximately 50 wells could experience water level declines of greater than 1 foot and 31 wells could experience drawdown of greater than 2 feet. Under either average of maximum pumping conditions, the flow of some artesian wells and the yield of some pumped wells in the immediate vicinity of the SJRPP would be reduced.

Any increased production from the Floridan Aquifer has the potential for inducing increased chloride concentrations within the Aquifer. Chloride concentrations in the Floridan Aquifer can generally be correlated with high rates of production, particularly from deeper zones. The proposed project could contribute to long-term increases in chloride contamination of the Floridan Aquifer. In addition, leachate from solid waste disposal areas will not be contained by the normal soils of the SJRPP landfill site. Solid waste disposal will therefore contribute leachate constituents to the water table aquifers which will probably discharge to surface water bodies down-gradient. The quantity of leachate, its chemical composition, and the precise change in groundwater quality are unknown at this time. The potential for groundwater contamination from leachate constitutes a major potential adverse impact of the project. A groundwater monitoring and testing program has been proposed to evaluate this potential problem.

5.1.4 Aquatic and Terrestrial Ecology

During construction, approximately 84 acres of valuable seasonally flooded wetlands and much of its associated fauna will be eliminated. Clearing of 364 acres of pine flatwoods would eliminate any remaining habitat suitable for gopher tortoises, gopher frogs, indigo snakes, and other species which depend on gopher tortoise burrows on the site. Construction activities and human presence in the area could disturb nesting or feeding activities of several rare, threatened, or endangered State and Federally listed birds which occur in the marshes just to the east of the site. These same species could also be affected by the discharges of treated sanitary and runoff wastewaters during construction into a headwater of Browns Creek marsh. Such a discharge could also adversely affect larval forms of commercially important fish and shellfish.

During operation, seepage of leachates from solid waste areas into Browns and Clapboard Creek marshes could contaminate the food web in these senitive wetlands. Trace element seepage from the percolation pond on Blount Island and discharges of copper, mercury, and other trace metals at the POD from SJRPP could also place a further stress on aquatic life in the St. Johns River estuary.

5.1.5 Sound Quality

Adverse noise impacts are expected to occur due to the construction of the SJRPP. Noise resulting from the normal construction activities associated with the project, however, would increase noise levels by only 2 dB at the nearest receptor. The most severe adverse noise impact would occur during steam blowout.

The steam blowout event would be of short duration (approximately 3 minutes) and would be preceded by notification to area residents.

5.1.6 Cultural Resources

The proposed project would have an adverse effect on the St. Johns River Power Park Archaeological District, a property deemed eligible for listing on the National Register of Historic Places. Sites 8Du634 and 8Du669 may be eliminated as the result of the siting of the rail loop and runoff sediment control pond. Site 8Du677 may be eliminated as a result of land modification activities related to the siting of a 90-acre solid waste disposal landfill.

5.1.7 Socioeconomic Conditions

Construction of the SJRPP would create a temporary influx of workers to the Jacksonville area. Additional public costs would be incurred as a result of the additional demands on various public services by the immigrant work force and their families. These additional costs, however, would be temporary and are not expected to be great. The operation of the SJRPP would generate a relatively small influx of workers. While the influx is more likely to locate permanently in the Jacksonville area, the public costs incurred will be minimal since they will be spread over a longer time frame and will be offset by various tax revenues.

5.1.8 Land Use, Recreation, and Aesthetics

No adverse impacts on land use are projected for the SJRPP site or the Blount Island coal unloading facility. The greatest effects on land uses would result from construction of the transmission lines. It is probable that the selected transmission line right-of-way (ROW) would cross limited areas of medium density residential development. These crossings could result in the displacement of a small number of residences. The preferred corridor also includes two recreational areas - a golf course and tennis courts. It may be possible to avoid these areas by altering tower designs. Most of the land uses of the selected transmission line corridor, however, would be compatible with existing patterns. The SJRPP would add tall cooling towers, a 640 foot exhaust stack, a coal pile, and sludge and ash disposal landfills to the existing vista of the area. The taller structures would be visible from Heckscher Drive and New Berlin Road and residences along these highways would be affected by these dominant industrial features.

5.1.9 Transportation

Construction of the SJRPP would result in several adverse impacts to transportation systems in the area of the plant. Increased traffic on Heckscher Drive and New Berlin Road would exceed the desired level of service for urban design conditions and traffic congestion would occur at the following intersections during rush hours: Interstate Highway 95 and Heckscher Drive; Main Street and Heckscher Drive; Main Street and New Berlin Road; Main Street and Eastport Road; and Heckscher Drive and New Berlin Road.

Adverse transportation impacts due to the operation of the SJRPP would result from coal trains entering and leaving the site. Traffic would experience delay when the unit trains cross Main Street, Eastport Road, New Berlin Road, and Heckscher Drive. The impact would be the most severe when the trains cross these roads during rush hours.

5.1.10 Human Health Impacts

If the operation of the SJRPP were to result in a violation of the 24-hour FAAQS for SO_2 as predicted, there would be an increased potential in the vicinity of the violation for deleterious effects on the health of the elderly and those with acute and chronic respiratory disorders. All other regulated air pollutants are predicted to be in compliance with applicable standards. There could be a small increase in the concentration of some trace elements in the Jacksonville area, but no increase in potential health risks is anticipated. No adverse human health impacts are projected to result from wastewater discharges; however, there may be some increased risk of health impacts due to the potential contamination of groundwater in the vicinity of SJRPP.

5.1.11 Energy Impacts

No adverse impacts on energy resources are anticipated from the construction or operation of the proposed project.

5.2 IDENTIFICATION AND EVALUATION OF AVAILABLE MITIGATIVE MEASURES

This section summarizes the measures which are available to mitigate potential impacts of the construction and operation of the SJRPP on the natural and man-made environment. Included are discussions of measures for minimizing impacts on air, water, earth, biological, economic, cultural, and human resources.

5.2.1 Mitigation of Construction-Related Impacts

Seveal methods are available which can effectively mitigate many of the proposed project's adverse construction impacts.

5.2.1.1 Air Resources

Appropriate methods of dust control and dust emission prevention will be used to mitigate effects of construction in the vicinity of the proposed site. Air quality control rules of the State of Florida for fugitive dust emissions and open burning will also be met (Florida Department of Environmental Regulation, Chapter 17-2.04(3) FAC; and Florida Division of Forestry, Chapter 51-2 (FAC). To comply with these regulations, all reasonable precautions will be taken to prevent fugitive dust emissions during construction. Such precautions will include using asphalt, oil, water, or dust-suppression chemicals for the control of dust from grading and clearing operations and on dirt roads.

During construction, vegetation will be cleared in the main site area and along the transmission line ROW. Open burning of debris must comply with the following conditions:

- Burning will be performed between 9:00 a.m. Eastern Standard Time (EST) and one hour before sunset; at other times, a forced draft system will be used;

- The burning location will be at least 45 meters (50 yards) from the nearest occupied building or public highway;

- Piles will be no larger than can be burned within the designated time;

- Moisture content anc composition will be favorable for good burning; and

- Smoke emissions will not exceed 40% capacity or Number 2 on the Ringelmann chart except during startup.

Adherence to the above practices will minimize air-related impacts during the construction phase.

5.2.1.2 Water Resources

Main Site and Blount Island

Potential impacts on water resources during the construction phase will be related primarily to erosion and sedimentation. Accelerated erosion will be controlled by compaction of embankments, early soil stabilization, limiting the size of exposed areas, maintenance of relatively flat grades, stabilization of stormwater flat grades, and stabilization of stormwater outlets and flat bottom ditches as well as other appropriate erosion control techniques.

Sedimentation will be controlled during construction by use of sediment control basins and traps, filter berms, straw bales, perforated riser pipes at drainage structures, or other applicable devices as appropriate. Site drainage will be toward the south to a sedimentation pond located near the plant loop. This pond will be sized to provide 24-hour detention of stormwater runoff for the 10-year, 24-hour rainfall event to ensure compliance with effluent standards. The draft NPDES permit will require that overflow discharges from the pond do not exceed 30 mg/l of total suspended solids, although the means by which this limit is to be achieved has not been identified.

Earthmoving activities will be staggered so that the surface area of disturbed land at any one time is limited. With the exception of that area occupied by plant components, exposed areas will be revegetated with pines and other vegetation native to the site and beneficial to wildlife.

Effluent from the sanitary wastewater treatment plant and runoff from the site will be collected in a sedimentation pond prior to discharge to Browns Creek marsh. However, this waste will have a great potential for producing adverse impacts on this sensitive wetland. The total residual oxidants (TRO) concentration in the effluent from the pond (NPDES 002) should be maintained at a level no greater than 0.01 mg/l or the discharges should be routed to the NGS discharge channel (NPDES 001) in order to effectively mitigate these impacts.

Transmission Line ROW

Potential erosion-related impacts on water resources which could result from ROW construction will be mitigated by adhering to the following guidelines established by the Federal Power Commission (1971):

- The time and method of clearing the ROW will take into account soil stability and protection of vegetation;

- Trees, shrubs, grass, and topsoil not cleared will be protected from damage during construction;

- Clearing of the ROW to the mineral soil will be avoided. If this does occur, topsoil will be replaced and stabilized without undue delay by planting appropriate vegetation;

- Scars on the ground surfaces in erosion prone areas will be repaired and replanted;

- Terraces and other erosion control devices will be constructed where necessary;

- Where the ROW crosses streams, the banks will be stabilized and if necessary culverts will be constructed to minimize alterations in water flow;

- Construction access roads will be stabilized by erosion control measures and by planting grass and other appropriate vegetation. Roads will be designed for proper drainage;

- Service and access roads will be used jointly when possible;

- Exposed ground will be sprayed with water to reduce dust as needed; and

- Periodic inspection of the transmission line will include observations for areas of erosion; these areas will be noted and promptly stabilized.

Adherence to the above guidelines will ensure that water quality in area streams, rivers, and wetlands will not be degraded due to increased erosion. In addition, no chemical sprays or defoliants will be used during the construction phase. During operation some herbicides will be used to control vegetation. These materials will be used in strict accordance with all applicable regulations and manufacturers' instructions.

Dredging at Blount Island and Mill Cove

Dredging activities at the Blount Island coal unloading facility and for the transmission towers in Mill Cove could have potential impacts on water quality. These impacts will be mitigated by limiting dredging activities from late fall to early winter (November through early January). The material resulting from any subsequent maintenance dredging will be pumped to the Quarantine Island disposal area if adequate capacity is available and permitted by the Jacksonville Planning Authority and the USCOE. If not, an alternative existing spoil area to the north/northeast of the ROW will be used. All dredging and filling activities must be permitted and approved by the USCOE.

5.2.1.3 Groundwater Resources

Any potential construction-related impacts of dewatering will be mitigated by employing groundwater control measures in the vicinity of the site. These measures will be designed to limit the lateral extent of dewatering effects and minimize the quanitities of groundwater which must be produced in order to achieve the desired level of dewatering. The control measures could include such techniques as the use of sheet pilings, slurry walls, grout curtains, or dewatering wells constructed on benches within the excavation.

5.2.1.4 Biological Resources

Sensitive Areas

A total of approximately 65 acres of hardwood swamp in the northwestern portion of the SJRPP property and remaining portions of other seasonally flooded wetlands will be preserved. The draft NPDES permit will require a buffer zone approximately 200 feet in width around each of the on-site wetlands which are contiguous with the St. Johns River or its tributaries. In addition, the permit will require that the boundary of the buffer zone be defined by a fence which will serve to restrict access to the wetlands and aid in the preservation of these areas.

Wetlands along the transmission line ROW could also be affected by construction activities. Mats will be used to support heavy equipment in these areas. If towers must be located in a marsh, the marsh habitat will be disturbed only in the immediate tower foundation areas. When construction in a particular area is complete, the mats will be removed.

Wildlife Resources

When possible, construction of solid waste disposal areas in close proximity to the rookery near the SJRPP site will be timed to avoid disrupting nesting birds in spring and early summer. The gopher tortoise, listed as a species of special concern by the Florida Game and Freshwater Fish Commission, is abundant on the site. An effort will be made to capture and transport these reptiles to another area prior to construction. However, the feasibility of relocation will first be evaluated through consultation with appropriate State agencies since this may be a difficult procedure (Shapiro 1981).

On Blount Island, spoil areas on and near the existing ROW have potential as nesting habitat for the least tern (Sterna albifrons) and osprey (Pandion haliaetus). Construction in these areas will be avoided.

Aquatic Habitats

Potential construction-related impacts on aquatic habitats will be mitigated as described under water resources (Section 5.2.1.2).

5.2.1.5 Land Use and Socioeconomics

It is probable that the selected transmission ROW will cross limited areas of medium density residential development. Such crossings may result in the displacement of a small number of residences. These crossings will be avoided when possible. The preferred corridor section to the Robinwood Substation includes a limited area of private recreation facilities. It may be possible to avoid crossing these recreation areas by using tower designs which decrease the transmission line ROW width and by changing the tower location.

5.2.1.6 Cultural Resources

Avoidance, protection in place through project design, and data recovery are the basic options available for mitigation of potential impacts on cultural resources. The applicants have identified an area within the SJRPP tract which will be fenced off in order to restrict land access to most archaeological sites, but site 8Du699, the largest and perhaps most significant site in the archaeological district, would be destroyed as a result of the siting of a sedimentation control pond adjacent to the rail loop. The Florida SHPO has recommended salvage archaeological excavation of any of the identified archaeological resources which cannot be avoided or preserved in place.

Archaeological excavation includes data recovery using scientific methods, analysis and preservation of archaeological and historical materials and information that otherwise would be lost, and the study of these resources in their original physical context. Data recovery programs through archaeological excavation are usually undertaken only as a last resort to save important information prior to any land modification activities while allowing construction to proceed on other areas of the proposed site.

The administrative procedure for mitigation preferred by USEPA is a formal Memorandum of Agreement (MOA) (36 CFR 800.6(c)). A formal request must be submitted to the Advisory Council on the Historic Preservation (ACHP) to initiate the MOA procedure. The procedure requires the submission of a preliminary plan to mitigate adverse effects. This consultation process will result in a formal MOA signed by all concerned parties. The mitigation specified in the MOA will be incorporated in the proposed project's NPDES permit as a special condition.

5.2.1.7 Noise and Transportation

Noise levels due to the operation of construction equipment will be minimized by requiring contractors to make use of modern low noise level equipment. Most construction activities will take place during daylight hours which will further reduce noise impacts. Steam blowout at the start-up of each unit is expected to present the greatest noise impact. Such operations will occur intermittently over a two week period per unit. Steam blowout will be restricted to daylight hours with prior notice made to the public.

Traffic will be controlled by limiting site access to required delivery vehicles. Employee parking will be restricted to a designated area located near the construction office. New Berlin Road will experience extensive truck traffic during site preparation and plant construction. Any damage to the road surface resulting directly from this plant-related traffic will be repaired.

5.2.2 Mitigation of Operation-Related Impacts

5.2.2.1 Air Emissions

JEA and FP&L propose to incorporate air pollution control facilities into the proposed project to control emissions of sulfur dioxide, nitrogen oxides, particulates (fly ash), carbon monoxide, hydrocarbons, and fugitive dust. Other trace pollutants will also be removed from the plant emissions along with the major criteria pollutants. All of the systems are designed to meet the NSPS and the BACT requirements of USEPA's PSD regulations. However, a violation of the 24-hour Florida SO_2 standard is predicted to occur. The FDER is currently negotiating with JEA to develop measures to reduce SO_2 emissions to acceptable levels.

Emissions of particulates from the boilers will be controlled to the 99.78% level by the use of electrostatic precipitators (ESP) (JEA/FP&L 1981a). Two ESP's will be provided for each generating unit to assure reliability of operations. Emissions of nitrogen oxides will be controlled to levels required under the NSPS by the design and control of boiler operations (JEA/FP&L 1981a). Carbon monoxide emissions will also be controlled by boiler design and operation. Emissions of sulfur dioxide will be controlled to the 90% level by the use of limestone flue gas desulfurization (FGD) system which will follow the ESP system (JEA/FP&L 1981a).

Potential cooling tower draft impacts will be mitigated by using drift eliminators and barriers within the cooling towers and limiting the cycle of concentration to 1.5 or less. These measures will reduce the drift to 0.002% of the recirculating water volume of the towers.

Fugitive dust will be produced by a number of sources including the coal, limestone, fly ash, and FGD waste handling disposal systems. Proposed mitigative measures to control these sources of particulates include:

- Coal Handling. Fugitive dust will be controlled by different methods at each point in the coal handling system. Wetting agents (90-99% efficient) will be used on the various coal piles; fabric filters (99.9% efficient) will be used to clean emissions from the coal barge terminal unloader, conveyor transfer points, and the surge bins of the coal handling building. Water spray systems (97% efficient) will be used on the stacker reclaimer and rotary dump areas. Conveying systems will be totally enclosed.

- Limestone Handling. Limestone dust from unloading railcars will be suppressed with water sprays. The limestone will be transported on enclosed conveyors; hoppers will be vented to fabric filters.

- Fly Ash and FGD Sludge Handling. Fly ash will be transported in enclosed conveyors with fabric filters at all transfer points. Fly ash will either be sold as a by-product or mixed with wet scrubber sludge and stored in an on-site landfill.

5.2.2.2 Surface Water Resources

Water Intake

It appears that the impingement control system serving the NGS/SJRPP cooling water intake is not functioning properly. Further mitigation of the present impingement of aquatic organisms at the NGS intake screens appears necessary. It is recommended that this situation be improved without delay.

Wastewater Discharge

Potential impacts of wastewater discharges on surface waters will be mitigated by treating the process waste streams to the best extent practicable using the latest technologies. Individual process wastewater streams contributing to the discharge include: cooling tower blowdown; demineralizer regeneration wastes; flue gas desulfurization (FGD) system blowdown; metal cleaning wastes; coal and limestone storage area runoff; ash and FGD solids handling and temporary storage area runoff; sanitary wastes; active solid waste landfill runoff; and miscellaneous (mostly oil-bearing) wastes. Most of these wastewater streams will be combined and treated in the chemical wastewater treatment facility. The metal cleaning waste stream will be treated separately from other wastes to assure it has met applicable USEPA iron and copper limits. Cooling tower blowdown will be combined with treated wastewater streams prior to discharge. Oil-bearing wastes will be collected and treated in oil/water separators and the water portion will be sent to the main pump sump after treatment. Despite these measures, violations of water quality standards will occasionally result. JEA has applied for a variance from Florida Class III water quality standards in recognition of this fact.

In order to accurately assess the effects of the predicted water quality violations in the St. Johns River, it is recommended that a bioassay test program on the NGS/SJRPP discharge be initiated. The results of this program would be used to indicate the adequacy of the proposed wastewater treatment system and the possible need for additional mitigation.

Runoff Control

Runoff will be controlled by several sedimentation ponds. These will include two coal pile runoff ponds (one on the main site and one on Blount Island), a sedimentation pond treating runoff from the solid waste handling and temporary storage areas, and sedimentation ponds constructed to collect runoff from the active solid waste landfill area and the solid waste test cell area.

Of the sedimentation ponds, only the main plant and Blount Island coal pile runoff sediment control ponds will be lined with an impermeable material. Other plant facilities which will be lined with the same material include the metal cleaning waste retention basin and the flow equalization basin. The sedimentation ponds will be designed with sufficient capacity to satisfy the regulatory requirements for runoff control and to process the volume associated with the 10-year, 24-hour rainfall event.

Effluent from the main plant coal pile runoff sedimentation pond will be treated at the central wastewater treatment facility. Effluent from the landfill and solid waste handling and temporary storage area runoff sedimentation ponds will also be treated in the central wastewater facility. Effluent from the Blount Island coal pile runoff sedimentation pond will be treated prior to discharge into the percolation pond. However, some trace elements will still reach the St. Johns River estuary via seepage through the percolation pond. This facility would need to be designed for zero discharge if impacts on water quality and aquatic life are to be fully mitigated.

5.2.2.3 Earth Resources

Solid Waste Disposal

Large volumes of solid wastes will be generated at the proposed SJRPP facility by the FGD system and the fly ash and bottom ash collection systems. Smaller volumes of semi-solid sludges will be generated by the cooling towers and the various wastewater treatment systems. All of the high volume residues will be commingled and disposed of on-site if they cannot be sold as marketable by-products. Because of the absence of specific plant coal and leachate characteristics, a solid waste storage program will be implemented. Its elements include an on-site solid waste disposal test program and an on-site landfilling operation for material not directly associated with the test program.

Material in areas to be tested will be disposed in cells lined with impermeable plastic. Material not a part of the testing program will be disposed of in 10 acre landfill cells designed to minimize leachate caused by rainfall infiltration. Measures to minimize leaching will include locating the base of the landfill above the seasonal high water table, compacting the base material to 9.0 x 10^{-6} cm/second permeability, compacting waste material in layers, compacting and sloping the top surface of the landfill, surrounding the disposal area with diversion berms, and vegetating the covered landfill. However, some seepage from these unlined cells will still occur. Therefore, the design of these disposal areas should be altered to include linings which would approach or equal 1.0 x 10^{-7} cm/second if effective mitigation is to be achieved. An additional mitigative measure would be to defer use of solid waste disposal area A in the early operational stages of the project. Use of solid waste area B instead would minimize the potential for leachate to enter the Browns Creek marsh since area A is closer to this sensitive area.

Groundwater Resources

Potential impacts to groundwater arising from leachate from coal piles on the main site and liquid waste ponds will be mitigated by lining these areas with a material with a permeability of approximately 1.0 x 10^{-7} cm/second. As discussed above, however, some solid waste disposal areas and sediment ponds receiving solid waste area runoff will not be lined with impermeable material and therefore are a potential source of contamination of groundwater in the area. To mitigate these potential impacts, these areas should all be fully lined and designed for eliminating seepage.

In order to minimize chloride contamination of the main water supply wells at SJRPP, JEA proposes to complete the wells in the upper part of the Ocala limestone. In addition, it is recommended that the proposed wells be spaced as far apart as possible in order to reduce the localized drawdown of the Floridan Aquifer. The majority of high quality groundwater to be used at SJRPP will be for the production of marketable quality FGD sludge (gypsum). Therefore, if the FGD sludge cannot be marketed, non-potable water should be substituted for groundwater in the FGD process to the greatest extent possible.

5.2.2.4 Human Health

Potential effects of the proposed project on human health are primarily related to increases in the ground level concentration of SO_2, NOx, and particulates. The proposed emission controls should be adequate to mitigate any adverse impacts on human health. However, the predicted violation of the 24-hour State standard for SO_2 is indicative of the need for better control of this pollutant. The FDER is currently negotiating with JEA to develop mitigative measures which will reduce potential impacts to an acceptable level.

5.3 UNAVOIDABLE ADVERSE IMPACTS

The proposed action would result in certain adverse environmental impacts despite the emphasis on state-of-the-art impact control technology in all project phases. Some of the impacts are unavoidable consequences of a commitment to project objectives. Others, while avoidable, are regarded as insignificant compared to the cost of their elimination. In the SJRPP project, every effort will be made to ensure the most environmentally favorable tradeoffs between construction and operation of the generating units and the use of air, land, and water resources.

5.3.1 Atmospheric Resources

An increase in pollutants released to the atmosphere as a result of the proposed SJRPP would result. The emissions of nitrogen dioxide and particulates from the SJRPP would not result in a violation of Federal or State ambient air quality standards. As a result of on-going negotiations between FDER and JEA, sulfur dioxide emissions are anticipated to be within acceptable levels. Air emissions would use up portions of available Prevention of Significant Deterioration Class II increments at points close to the facility. This would not preclude future industrial development in the site region. No adverse effects on the nearby Okefenokee Class I area are projected.

Emissions of sulfur dioxide and nitrogen oxides have been associated with acid precipitation. To date, however, only a general relationship has been established. The relationship between emissions of the precursor pollutants from a particular source and acid deposition in a particular area remains speculative. The most highly publicized relationship is that between emissions from the industrial midwestern and the eastern United States and acid rain in the northeastern United States and Canada. It is therefore difficult to determine how much of an adverse impact the SJRPP would produce with respect to acid rain.

5.3.2 Land Resources

A total of 1,656 acres of land would be preempted from other uses during the life of the project. This would include a loss of 84 acres of seasonally flooded wetlands and 364 acres of pine flatwood habitat. This would result in loss or displacement of the wildlife and rare, threatened, or endangered species now inhabiting these areas. These are considered to constitute unavoidable adverse impacts if the SJRPP were built and to be operated. A total of 882 acres of habitat (including the above habitat types) will be eliminated on the main site as would an undetermined amount of transmission line ROW acreage.

5.3.3 Water

Discharge of cooling tower blowdown and wastewater treatment plant effluent would cause or exacerbate additional violations of Florida Class III water quality standards for several trace metals when water quality of the River approaches or exceeds the applicable standards. This would have an adverse impact on water quality and aquatic life in the St. Johns River estuary. Also, dredging of the turning basin at the Blount Island coal unloading facility and during tower construction in Mill Cover would temporarily eliminate benthic invertebrate populations in a 21 acre area. The current level of aquatic organisms entrained through the NGS intake will continue and because of the use of the intake by SJRPP some entrainment will continue after retirement of NGS Units 1, 2, and 3.

5.3.4 Sensitive Areas

Discharge of sanitary wastewater and plant runoff from the sedimentation pond for six years during construction could adversely affect the Browns Creek salt marsh. This area is a sensitive nursery, spawning, and feeding ground for numerous commercially important fish and shellfish. Several protected species of birds also feed, roost, or nest here.

Elimination of 84 acres of seasonally flooded wetlands on the main site would permanently remove these resources as part of the interconnected wetland system in this portion of the St. Johns River estuary. This would constitute an unavoidable adverse impact on biologically sensitive areas.

5.4 RELATIONSHIP OF SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

During the proposed [illegible]-year life of the SJRPP, the air, water, and land resources of the site will be committed to the production of electric power.

Some additional commitment of new resources beyond the site would also be required since the existing transmission line ROW would have to be widened slightly. Elimination of wetlands on the site itself will contribute to a decline in the overall productivity of the Browns Creek estuarine area by permanent elimination of 84 acres as a potential source of food and habitat.

The production of electricity during the operating life of the station will contribute to tourism and other industries within the JEA service area and within those of other utilities purchasing power from SJRPP. This electric power will accomodate the projected increase in the population of the region and the projected electrical needs for the FP&L system.

5.5 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The proposed plant will consume an estimated 95.7 million tons of coal during its 40-year life. The consumption of fuel oil for start-up and flame stabilization is expected to be 169,000 barrels over the life of the station.

The flue-gas-desulfurization system will use an estimated 8.6 million tons of limestone during plant life. Most of this resource will be irretrievably committed. Some, however, will be recovered as gypsum which will be sold for wallboard manufacture.

Materials like concrete cannot be recycled and thus will be irretrievably committed to the construction of the station. Other materials such as steel and aluminum may be reclaimed if it is economically feasible. Other construction requirements such as labor and capital will also be irretrievably committed to the proposed project.

Land containing a variety of habitat types would be permanently committed in areas to be used as solid waste disposal areas. A small one acre salt marsh on Blount Island would also be permanently committed.

6.0 SUMMARY OF SAR/EIS FINDINGS

As a result of the alternatives screening, selection, and evaluation process utilized in this SAR/EIS, no specific conclusions are made regarding an environmentally and economically preferable overall alternative. The basic level of detailed information available for the alternatives to the SJRPP and the broad economic and environmental assumptions required to make comparisons among the alternatives prevents the identification of any one of the alternatives as being clearly superior. However, certain generalizations regarding the evaluation of the No Action Alternative, SJRPP, and Alternatives 1 through 4 can be stated along with a recommended course of action.

6.1 SUMMARY OF ECONOMIC ANALYSIS

The economic analysis of the alternatives and the proposed project (Section 2.6.4) focused primarily on the cost savings that could be realized by displacing oil-fired generating capacity. This analysis was based solely on the capital and operating costs of each alternative and did not take into account the differing levels of additional generating capacity provided by each alternative in comparison to SJRPP. Various other scenarios also had to be factored into the analysis including variations in fuel costs (oil and coal), the cost-effectiveness of the Blount Island coal handling facility, and the actual cost of purchasing nuclear power from Georgia Power Company. Consequently, the findings of this analysis serve primarily as an indicator of the economic comparability of the alternatives of oil savings rather than as an indication of the most cost-effective alternative overall.

With respect to the primary issue on which the project is currently being proposed, oil displacement, several of the alternatives appear to be attractive. The proposed project and Alternatives 2, 3, and 4 would be less expensive than continuing to burn oil in the JEA and FP&L systems. On a total basis, Alternatives 2, 3, and 4 appear to be comparable or greater in savings than SJRPP if the level of additional generating capacity is not considered. All four alternatives provide cost savings to JEA (due largely to the relatively less expensive purchase of power from Georgia Power Company) while Alternatives 2, 3, and 4 provide cost savings to FP&L due to the financial attractiveness of the Sanford coal conversion. Consequently, it appears that three of the four alternatives can meet the economic criteria used to justify the SJRPP; that is, they displace oil-fired generation at a low cost. It must be recognized, however, that proceeding with SJRPP does not preclude either JEA or FP&L from proceeding with these other alternatives.

6.2 SUMMARY OF ENVIRONMENTAL ANALYSIS

The environmental analysis of the SJRPP and the alternatives (Chapter 4.0) focused on the potential impacts of implementing the projects on twelve resource areas. This analysis was based on site- and project-specific data and detailed analyses for the SJRPP site and impact area while more general data and analyses were utilized for the alternatives. Consequently, although impact analyses were carried out for each alternative, the level of detail provided in these analyses varies significantly between the proposed project and the alternatives.

As expected, the No Action Alternative results in the fewest adverse environmental impacts. In comparing the action alternatives, it was generally found that the greater the magnitude of the alternative, the greater the degree of both beneficial and adverse environmental impacts. Location was also found to be a major factor in the level of impacts. As a result, SJRPP would generate the greatest overall level of beneficial economic impacts while also generating the greatest level of adverse impacts (land consumption, water quality degradation, etc.). Those alternatives which include solar hot water heating systems and refuse-fired power plants result in significant environmental benefits for some resource areas since these components are more environmentally benign; that is, they encourage conservation and recycling. Similarly, the alternatives which include the purchase of power from Georgia Power Company result in reduced adverse environmental impacts since the resource consumption and pollutant generation of Plant Vogtle are considered to occur regardless of whether JEA and FP&L purchase the power or not. Of course, there is no assurance that such impacts will occur.

Many of the adverse impacts of the proposed project which cannot be completely mitigated are a function of its location. The impact on wetlands and the exacerbation of existing water quality problems may not have occurred at other alternative site. Based on the site selection study, however, the lack of availability of other sites and/or political opposition to their selection appeared to present delays that could not be economically tolerated in Jacksonville. Therefore, a more readily available but more environmentally sensitive site was selected. Because of this the applicants have been willing to exert additional effort toward mitigation of the project impacts.

6.3 ALTERNATIVES TO THE PROPOSED PROJECT

Based on the preceding discussions, it is apparent that viable alternatives to the construction and operation of the SJRPP exist. Alternatives were developed based on their ability to meet the same economic goals which were identified by the FPSC as the reasons for approving the early construction of SJRPP. The alternatives were judged to equal the economic benefits of the SJRPP by satisfying the following criteria:

- the alternative would replace or save oil equivalent to or greater than the oil saved by the proposed project;
- the alternative must replace an amount of oil for each utility (JEA and FP&L) equivalent to the oil displaced by the proposed coal-fired power plant;
- the alternative must not result in any loss of capacity to either utility; and
- the alternative must be implementable within the proposed time frame of the SJRPP project (1987).

The selection of one of the alternatives over the proposed project would satisfy the economic need but it would not take into account JEA's and FP&L's long-range system management plans including potential voluntary coal conversions and the long-term need for additional generating capacity. It must be noted that the SJRPP provides a much greater level of additional generating capacity than any of the alternatives. Consequently, there are future costs required to supply this additional capacity under the alternatives which have not been factored into this analysis.

6.4 RECOMMENDED COURSE OF ACTION

It is anticipated that JEA and FP&L will resolve the outstanding environmental issues associated with the SJRPP. USEPA would then propose to permit the proposed project with certain conditions. The NPDES permit and other regulatory requirements would be met by the proposed project. It must be noted, however, that based on the initial findings of this SAR/EIS, various alternatives to the proposed project are available and appear to be at least comparable to the SJRPP from an economic and environmental standpoint. Since these alternatives meet the oil backout goals of the proposed project, it can be argued that one of these alternatives should be implemented. The selection of one of these alternatives would defer a decision on the SJRPP for approximately three to four years when possibly the need could be better predicted and mitigation of impacts might be greater through improved technology. However, proceeding with SJRPP does not preclude the implementation of alternatives evaluated in the SAR/EIS. USEPA recommends that JEA and FP&L carefully consider such options in future systems planning.

The following conditions for the NPDES permit are proposed as a result of the findings of the SAR/EIS:

- No herbicides shall be used in the initial clearing operations of transmission line rights-of-way (ROW). Thereafter the use of herbicides for maintenance shall be minimized and shall be used in strict accordance with USEPA-approved products and procedures.

- During ROW clearing operations and transmission line tower construction, an undisturbed 25 foot wide buffer shall be maintained adjacent to all streams, rivers, or lakes. Within this zone, selective topping of trees or removal of conflict trees which topping would otherwise kill is allowable but is to be done without disturbance of the root mat.

- The Permittee shall comply with terms of a Memorandum of Agreement which will provide acceptable mitigation of adverse impacts to archaeological resources on the SJRPP site (the MOA will be negotiated and presented in the Final SAR/EIS).

- The Permittee shall line each on-site solid waste landfill area prior to active disposal operation at the landfill. If other than an impervious liner is employed, the permeabilities of the liner shall be on the order of 1×10^{-7} cm/second and a minimum of three feet in thickness. If a permeable liner material is selected, results of permeability tests by an independent testing laboratory are to be submitted to USEPA no less than 90 days prior to landfill operations to document compliance with this requirement. Based on a minimum of two years of testing data of waste produced by SJRPP, Permittee may propose to USEPA to use less stringent leachate controls.

- The Permittee shall utilize solid waste disposal area "B", north of Island Drive, prior to clearing and utilization of disposal area "A".

- An undisturbed buffer zone approximately 200 feet in width shall be maintained between all construction activity areas and on-site wetlands contiguous with the St. Johns River or its tributaries. The buffer zone is to be defined by placement of a fence at the upland limit of this buffer zone as depicted on Figure 3.5-1 of the SAR/EIS. The buffer zone shall exist along the external southeast side of the plant rail loop.

- The use of groundwater from the wellfield for plant service water for SJRPP shall be minimized to the greatest extent practicable but in no case shall exceed 7.6 mgd on a maximum daily basis or 5.1 mgd on an average basis. If it is determined that the FGD sludge cannot be economically marketed as a gypsum product, the Permittee shall assess the feasibility of using non-potable alternative water supplies to replace high quality groundwater in scrubber operation. The assessment is to be submitted to USEPA and must include specific water quality requirements of the scrubbers and levels of corrosive constituents in alternative water supplies.

- After consultation with and approval from USEPA, the Permittee shall institute a groundwater monitoring program as outlined in the State of Florida, Conditions of Certification, Sections II.B.2 and II.F.6. Monthly data shall be submitted quarterly to USEPA commencing one year prior to commercial operation of Unit 1.

- A bioassay test program shall be performed on the combined NGS/SJRPP discharge effluent (NPDES 001) commencing at the start of commercial operation of Unit 1. One 96-hour continuous flow-through test of the effluent is to be performed each quarter of the year. Quarterly testing reports are to be submitted to the USEPA. Additionally, a monthly screening test (96-hour continuous flow-through bioassay) on the full strength effluent and a control is to be performed during the first year and reported quarterly. At the end of the first year, the monthly screening test may be discontinued upon receipt of USEPA approval. Permittee shall submit a detailed study plan for the bioassay to USEPA for review and approval at least six months prior to beginning the test program. The study plan shall propose methodology, indigenous test species, appropriate quality control measures, and test program operation.

The complete FDER Conditions of Certification are presented in Appendix I and the complete Draft NPDES Permit is presented in Appendix A.

7.0 LIST OF PREPARERS

7.1 US ENVIRONMENTAL PROTECTION AGENCY

Robert B. Howard	Chief EIS Preparation Section Sanitary Engineer
F. Theodore Bisterfeld	Project Officer Biologist
Charles H. Kaplan	NPDES Permit Coordinator Chief, Power Plant/Synfuel Unit
Henry G. Strickland	Water Quality Engineer
David Holroyd	Air Resources Engineer
Louis Nagler	Meteorologist
Ronald Raschke, Ph.D.	Aquatic Resources Aquatic Ecologist
Gail Mitchell	Groundwater Groundwater Hydrogeologist
Michael J. Hartnett	Residuals Management Engineer
William L. Kruczynski, Ph.D.	Wetlands Resources Biologist

7.2 FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Hamilton S. Oven, Jr.	Administrator Power Plant Siting

Division of Environmental Programs

- Bureau of Air Quality Management
  - Larry George (Air Modeling Section)
  - Bill Thomas (New Source Review Section)
  - Bob King (New Source Review Section)
  - Ed Pelagyi (Air Quality Section)
  - Tom Walker (Air Modeling Section)
- Bureau of Drinking Water and Special Programs
  - Barney Barnes (Drinking Water Section)
  - Dr. Rodney DeHan (Groundwater Section)
  - Don Kell (Groundwater Section)
  - Sam Johnston (Hazardous Waste Section)
  - John Reese (Solid Waste Section)

Bureau of Water Analysis
  Dr. Lawrence Olsen (Biology Section)
  Scott McClelland (Water Quality Analysis)
  Steve Palmer (Water Quality Analysis)

Division of Environmental Permitting
  Stephen Fox (Director)

Bureau of Permitting
  Suzanne Walker (Bureau Chief)
  Karen Anthony (Power Plant Siting Section)
  Susan Boyd (Power Plant Siting Section)
  Joe Ryan (Power Plant Siting Section)
  Marvin Collins (Standard Permitting Section)

Jacksonville Subdistrict Office
  Frank Watkins
  John Ketteringham
  Tim Deuerling
  Catherine Farmer

Office of General Counsel
  Louis Hubener

7.3 WAPORA, INC.

Ronald B. McNeill	Project Manager
Steven D. Bach, Ph.D.	Assistant Project Manager/Biologist
Lawrence Olinger	Project Administrator
Jerald D. Hitzemann	Quality Control
William J. March, Ph.D.	Hydrologic Engineer/Meteorologist
Mirza Meghji, Ph.D.	Environmental Engineer
David M. Conner	Air/Acoustical Engineer
Kenneth Simonton	Acoustical/Transportation Specialist
Ruthanne L. Mitchell	Assistant Cultural Geographer/Draftsperson
Kim Banks	Archaeologist
Fred C. Mason III	Geologist
Walker J. Duncan	Geologist
Jan E. Dillard	Socioeconomist/Planner

Mark L. Cameron	Socioeconomist/Planner
Alyse Gardner	Biologist
Greg Seegert	Biologist
Wesley Powell	Editor

7.4 ENERGY AND ENVIRONMENTAL ANALYSIS, INC.

Seth Ira Schwartz	Project Engineer
John B. Stamberg	Quality Control
Stan M. Kaplan	Economic Analyst
Peter G. Goering	Engineering
Lauren P. McCombs	Alternatives Analyst
Stacie Foster	Alternatives Analyst

8.0 PUBLIC PARTICIPATION AND COORDINATION EFFORTS

8.1 PUBLIC PARTICIPATION

In accordance with State and Federal regulations, USEPA and FDER have conducted a public participation program in conjunction with the preparation of this SAR/EIS. This program consists of: (1) an initial publicly announced scoping meeting of citizens and leaders from Jacksonville/Duval Country and State and Federal government agencies at which the scope of the proposed SAR/EIS was discussed and the central issues identified; (2) institution of changes in the scope of the SAR/EIS which were identified as a result of the meeting; (3) a formal public hearing to present the results of the draft SAR/EIS and receive public comments; (4) distribution of the DEIS for public review; and (5) publication of comments in the final SAR/EIS.

The public scoping meeting was held 9 April 1981 in Jacksonville, Florida. Areas of concern which were identified at the time included:

- alternatives to building a new coalfired power plant;
- potential water quality violations in the St. Johns River;
- use of high quality groundwater in the SO_2 emission control scrubbers;
- impacts on groundwater quality from solid waste materials and coal piles;
- impacts on the air quality around Jacksonville, especially in the event of an emission control system malfunction;
- impacts on wetlands; and
- effects of emissions from the cooling towers on the surrounding areas.

At this meeting, representatives of USEPA and FDER also explained aspects of the Memorandum of Understanding between the two agencies and the purpose of coordinating the review efforts. The representatives identified the basic responsibilities of each agency. Other meetings have also been held regarding the proposed SJRPP project. On 5 May 1981 a land use and zoning hearing was held in Jacksonville to discuss land use impacts. The Florida Public Service Commission held a hearing on 22 and 23 May 1981 in Tallahasee regarding the need for the project. Through these mechanisms and continual day-to-day contact with local, State, and Federal officials as well as informed individuals, USEPA and FDER have consistently incorporated the public in this review process.

8.2 AGENCIES, ORGANIZATIONS, AND INDIVIDUALS INCLUDED IN THE DRAFT SAR/EIS REVIEW PROCESS

The comments of the following agencies and organizations are directly requested in the review of this project.

Federal Agencies

US ENVIRONMENTAL PROTECTION AGENCY

Room 537, West Tower
401 M Street, S.W.
Washington, D.C. 20202

Regional Administrator
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Department of Agriculture

Deputy Chief
Forest Service
Room 3029, S. Bldg.
Washington, D.C. 20250

Assistant Administrator
National Programs Staff
Agricultural Research Service
Washington, D.C. 20250

Director, National Resource
Economic Research Service
Economics Division, Room 412
Bldg. 500 12th Street, S.W.
Washington, D.C. 20250

Administrator
Soil Conservation Service
Room 5105 South Building
Washington, D.C. 20250

Soil Conservation Service
Federal Building
P.O. Box 1208
Gainesville, Florida 32601

Department of the Army

Chief of Engineering Division
U.S. Army Corps of Engineers
Jacksonville District
P.O. Box 4970
Jacksonville, Florida 32201

Department of Commerce

Economic Development Administration
Special Assistant for the Environment
Washington, D.C. 20230

National Marine Fisheries Service
Regional Director
Duval Building
9450 Koger Boulevard
St. Petersburg, Florida 33702

Department of Energy

Director of NEPA Affairs
Mail Station E-201, GTN
Washington, D.C. 20543

Energy Research and Development Administration

Office of Environmental Assessments
ERDA - Mail Stop E-201
Washington, D.C. 20545

Federal Aviation Administration

Office of Environmental Quality
AEQ-100
800 Independence Avenue, S.W.
Washington, D.C. 20591

Federal Energy Regulatory Commission

Commission's Advisor on Environmental Quality
825 North Capitol Street, N.E.
Washington, D.C. 20426

Federal Highway Administration

Director, Office of Environmental Quality
Room 3226, Nassif Building
Washington, D.C. 20590

Department of Health, Education and Welfare

Director, Office of Environmental Affairs
Room 4740, Hew North
Washington, D.C. 20202

Department of the Interior

Assistant Secretary - Program Development and Budget
Director, Office of Environmental Project Review
Department of the Interior
Washington, D.C. 20240

U.S. Fish and Wildlife Service
Regional Director
17 Executive Park Drive, N.E.
Atlanta, Georgia 30329

State Agencies

Florida Department of Environmental Regulation

Division of Environmental Permitting
2600 Blairstone Road
Tallahassee, Florida 32301

Department of Administration

Bureau of Intergovernmental Relations
Division of State Planning
660 Apalachee Parkway
Tallahassee, Florida 32304

State of Florida Department of State

The Capitol
Tallahassee, Florida 32304

State Historic Preservation Officer

Director, Division of Archives, History,
and Records Management
Department of State
401 East Gaines Street
Tallahassee, Florida 32304

Florida Game and Fresh Water Fish Commission

Randy Kautz, Ann Schapiro
Environmental Specialist
Farris Bryant Building
620 South Meridian Street
Tallahassee, Florida 32304

Florida Public Service Commission

Bob Trapp
Engineering Department
700 South Adams Street
Tallahassee, Florida 32304

St. Johns River Water Management District

E.D. Vergera
Executive Director
Don Thompson
Route 2
P.O. Box 659
Palatka, Florida 32077

Northeast Florida Regional Planning Council

Executive Director
8641 Baypine Road, Suite 9
Jacksonville, Florida 32216

Florida Department of Transportation

Haydon Burns Building
605 Suwannee Street
Tallahassee, Florida 32301

Jacksonville Area Planning Board

East Bay Street
Jacksonville, Florida 32202

Private Interest Groups

- Heckscher Drive Community Club
- Sierra Club, Power Plant Siting Committee, Florida Chapter
- Sierra Club, Jacksonville Chapter
- Jacksonville Chamber of Commerce
- Florida Clean Air Coalition
- Duval Audubon Society, Inc.
- St. Johns Citizens for Clean Air
- Mayor's Committee for the Environment
- Citizens to Sell JEA
- Arlington Jaycees
- Southside Businessmen's Club
- Florida Lung Association
- Clay Citizens Coalition
- Sea Oats Garden Club
- Duval County Young Republicans

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APPENDIX A

PSD PRELIMINARY DETERMINATION

Revised Preliminary Determination
Jacksonville Electric Authority
PSD-FL-010

I. Applicant

Jacksonville Electric Authority
P. O. Box 53015
233 W. Duval Street
Jacksonville, Florida 32201

II. Location

The Jacksonville Electric Authority (JEA), in cooperation with Florida Power and Light Company (FPL), proposes to construct a new power generating facility consisting of two 600 megawatt (MW) coal-fired steam generating units in Duval County, Florida. The construction site, known as the St. Johns River Power Park, is located adjacent to the existing JEA Northside Generating Station, approximately 15 kilometers northeast of downtown Jacksonville, Florida. The UTM coordinates of the proposed source are 446.9 kilometers east and 3366.3 kilometers north.

III. Project Description

The applicant proposes to construct a new power generating station consisting of two 600 MW turbine-generator units powered by two pulverized coal-fired steam generators (boilers), two auxiliary boilers, and coal, limestone, and fly ash handling facilities. The two proposed steam generators will fire a maximum of 6144 million Btu's per hour (MMBtu/hr) each or approximately 292.6 tons per hour each of a medium bituminous coal having a minimum higher heating value of 10,500 Btu/lb. Of the coals under consideration, the maximum sulfur content coal has 4.0 percent sulfur by weight.

Two 127 MMBtu/hr auxiliary boilers will be utilized to provide start-up and shutdown capability for the two turbine-generating units. The auxiliary boilers will be fired with No. 2 fuel oil having a maximum sulfur content of .76 percent by weight (wt. %) and a maximum higher heating value of 19,567 Btu/lb.

The cooling system will consist of two counterflow natural draft cooling towers located at the north end of the plant.

The coal handling facility provides for water delivery of coal by ocean-going barge or ship to a marine terminal located on Blount Island, Florida where a 30-acre coal surge pile will be operated. The coal will be transferred from the marine terminal to the proposed plant site by a shuttle train. The facility also will be capable of receiving direct rail car coal shipments. The coal handling equipment at the proposed plant site includes a rotary car dumper, yard area coal storage, transfer system, coal silos, and tripper floor distribution system. On the average, less than 10,000 tons per day of coal will be unloaded at the proposed source.

Limestone will be delivered to the proposed source by rail and stored in an open pile or dry storage silos.

IV. Source Impact Analysis

PSD regulations amended in the August 7, 1980, Federal Register require that a new fossil fuel-fired steam electric plant with potential emissions of 100 or more tons per year of any pollutant regulated under the Act undergo a PSD review for each pollutant which results in a significant net increase in emissions. Table 1 presents an emissions summary for the proposed new source. The proposed new source has potential emission increases of sulfur dioxide (SO_2) and other pollutants of greater than 100 tons per year and significant increases in particulate matter (PM), nitrogen oxides (NO_x), carbon monoxide (CO) and SO_2. Therefore, a PSD review is required for SO_2, NO_x, PM, and CO. A full PSD review consists of the following:

A. A demonstration that Best Availabile Control Technology (BACT) is being applied to all facilities emitting SO_2, PM, NO_x, and CO;

B. An analysis of existing air quality;

C. A demonstration that the source will not cause or contribute to any NAAQS violations;

D. A PSD increment analysis;

E. A growth analysis;

F. An analysis of impacts on soils, vegetation, and visibility; and

G. A Class I area analysis.

The proposed new source will be located in an area considered attainment for all pollutants under review. A non-attainment area for PM is located in the vicinity of Jacksonville, Florida, approximately 9 kilometers from the proposed new source at its closest point. Also, Duval County is nonattainment for ozone. The source, however, has insignificant emissions of VOC and therefore is not subject to review for this pollutant.

The JEA's application was considered complete prior to August 7, 1980. It should be noted that Table 1 in the Preliminary Determination and the Public Notice misrepresented emissions estimates for SO_2, NO_x, CO, and PM (pounds per hour in place of tons per year). Table 1 of this determination correctly summarizes these emissions rates. A notice of correction was published for public information.

A preliminary determination and public notice was made previously regarding the proposed construction. Subsequent design modifications to the plant, however, have necessitated issuance of this revised preliminary determination. Where necessary, additional analysis of emissions, controls, etc. were provided by the applicant. The revised preliminary determination correctly reflects the design of the proposed power generating station.

A. Best Available Control Technology (BACT)

Paragraph (i)(9) of the August 7, 1980 PSD regulations exempts this source from paragraph (j) of the regulations. Instead, paragraph (j) of the June 19, 1978 PSD regulations applies. Therefore, BACT must be applied to all emission units emitting SO_2, PM, NO_x, and CO because allowable emissions of these pollutants are greater than 50 tons per year.

Sulfur Dioxide

BACT must be applied to the two proposed steam generators (boilers) and the auxiliary boiler to control SO_2 emissions.

The applicant proposes to install a lime/limestone flue gas desulfurization (FGD) system on each of the proposed steam generators as BACT for SO_2. The SO_2 removal efficiency of a single FGD system is 90 percent (.76 lb/MM Btu SO_2 emissions determined in a 30-day rolling average). With emissions rates below 0.6 lb/MMBtu, the applicant will maintain a minimum 70 percent control efficiency consistent with the NSPS requirements for steam generating electric plants (40 CFR 60 Subpart Da).

Two other emissions control systems, a lime/limestone FGD with a 95 percent SO_2 removal efficiency and a lime spray drying FGD with a 90 percent SO_2 removal efficiency, were examined. The incremental cost of the higher efficiency lime/limestone FGD system was determined not to be cost effective with respect to the resulting improvement in air quality. The lime spray drying FGD system also was rejected on the basis of economics and the existance of favorable operating experience with alternate systems operating over a wide range of fuel characteristics. The New Source Performance Standard (NSPS) for electric utility steam generation was promulgated June 11, 1979. The NSPS limits SO_2 emissions to 10 percent of potential SO_2 emissions and a maximum emission rate of 1.2 lb/MMBtu heat input except when the emissions are less than 0.6 lb/MMBtu. At the latter emission rate, a minimum of 70 percent reduction (30 percent of potential emitted) in potential SO_2 emissions is required. The percentage reduction in potential SO_2 emissions is dependent upon the sulfur content of the coal. The proposed SO_2 control system meets all requirements of the NSPS for electric utility steam generation stations for the control of SO_2 emissions. A continuous monitor for sulfur dioxide emissions will be installed in the flue of both steam generators in accordance with 40 CFR 60.47a. The above emissions control system represents BACT for SO_2 emissions from the two proposed steam generators.

Auxiliary boilers will be fired with .76 wt. % sulfur fuel oil. The SO_2 emissions from the auxiliary boilers are small when compared to those from the main units. BACT for SO_2 emissions from the auxiliary boilers has been determined to be the firing of .76 wt. % sulfur fuel oil.

Particulate Matter

Application of BACT is required for the emissions of PM from the two steam generators (boilers), auxiliary boilers and coal, fly ash, and limestone handling facilities.

BACT for PM emissions from the two steam generators has been determined to be the installation of an electrostatic precipitator with a PM removal efficiency of 99.78 percent (.03 lb/MMBtu). Two alternative systems, an electrostatic precipitator with a PM removal efficiency of 99.85 percent (.02 lb/MMBtu) and a fabric filter with a PM removal efficiency of 99.85 percent (.02 lb/MMBtu), were examined in the BACT analysis. The higher efficiency electrostatic precipitator was determined not to be cost effective with respect to the resulting improvement in ambient air quality. The fabric filter system also was rejected on the basis of economics and the existence of favorable operating experience with the alternate systems. The NSPS for electric utility steam generation limits PM emissions fo .03 lb/MMBtu heat input. The proposed PM emissions control system meets the NSPS requirements for control of PM emissions. A continuous monitor for opacity emissions will be installed in the flue of both steam generators in accordance with 40 CFR 60.47a. The above system has been determined to be BACT for PM emissions from the two steam generators.

Control and collection of particulate matter emissions from the coal handling system will be accomplished by several different methods including totally enclosed conveying systems, water spray dust collection systems, and dust collection systems utilizing fabric filters.

Control of fugitive dust from limestone handling will be accomplished by the use of totally enclosed conveyors, fabric filter dust collectors, and wet suppression systems.

Fugitive fly ash emissions will be controlled at all transfer and discharge locations by fabric filters. The handling system utilized to transfer fly ash to and from ash storage silos is enclosed and exhausts are discharged through fabric filters. Transfer from silo storage will be through gravity feed chutes to sealed trucks for disposal in landfills or for sale.

Fugitive dissolved and suspended particulate emissions from the cooling tower will be controlled by high efficiency drift eliminators. Table 2 presents a fugitive emissions and control summary.

The above emission control systems represent BACT for fugitive emissions.

BACT for PM emissions from the auxiliary boilers has been determined to be the firing of No. 2 fuel oil with an ash content of 0.01 wt. %. Therefore, no air pollution control equipment for the purpose of PM reduction is warranted.

Nitrogen Oxides and Carbon Monoxide

BACT must be applied to the two steam generators and the auxiliary boilers to control NO_x and CO emissions. Emissions of NO_x and CO resulting from the combustion of coal is dependent on such factors of boiler design as the amount of excess air in the combustion chamber, flame temperature, burner spacing and burner design.

The applicant proposes to use combustion controls and modern boiler design for a maximum NO_x emission rate of 0.6 lb/MMBtu and to minimize CO emissions. The maximum CO emission rate will be determined during performance testing for compliance with NSPS (40 CFR 60.44a) and in accordance with Permit Condition No. 7. This is in agreement with the NO_x emission limit required in the NSPS for steam electric generating stations. Control of NO_x and CO emissions will be accomplished by flue gas oxygen monitoring systems to control the air/fuel ratio. In addition, continuous nitrogen oxides and CO meters will be installed in the flue of both steam generators in accordance with 40 CFR 60.47a.

The above emissions control system represents BACT for NO_x and CO emissions from the two steam generators and the auxiliary boilers.

B. Analysis of Existing Air Quality

Paragraph (i)(9) of the August 7, 1980 PSD regulations exempts this source from paragraph (m)(1) of the regulations. Instead, paragraph (n) of the June 19, 1978 PSD regulations applies. Therefore, an analysis of existing air quality for SO_2, PM, NO_x, and CO is required as deemed necessary by the Administrator because the allowable emissions increases of these pollutants are greater than 50 tons per year.

Monitoring data for SO_2, NO_x, and PM were obtained from the New Berlin monitoring site near Jacksonville, Florida for the year 1977. Monitoring data for CO was not available; however, the area surrounding the proposed new source has been classified attainment or unclassified for CO and therefore no NAAQS violations for CO are expected.

An air quality analysis using meteorological data from the Jacksonville International Airport was used to determine the maximum pollutant concentrations at the monitoring site when the contributions from large existing sources of pollution were negligible. These sources were the JEA Northside plant and the St. Regis Paper Company. These maximum background pollutant concentrations were determined to be representative of the existing air quality in the region of the proposed source. All monitoring, data collection procedures, and modeling analyses were conducted using EPA-approved techniques. The monitoring data was utilized in the NAAQS analysis in projecting the maximum ambient air concentrations of each pollutant under review. The results are shown in Table 3.

The applicant also performed site-specific monitoring of all criteria pollutants, the results of which were unavailable during technical review of the application and development of the preliminary determinatnon. The monitoring results do not conflict with the application analysis and the basis for the preliminary and final determinations. Furthermore, the ozone monitoring results do not indicate that a violation of the NAAQS (235 ug/M^3) has occurred in 1980 (212 ug/M^3 1 hr. maximum).

C. NAAQS Analysis

The EPA-approved dispersion models CRSTER (modified for use with multiple point sources of emissions) PTMPT and PAL were utilized to assess the total ambient air concentrations of SO_2, PM, NO_x and CO within 50 km of the proposed plant site. Meteorological data for the years 1970 - 1974 were obtained from weather stations located at Jacksonville International Airport (surface date) and Waycross, Georgia (upper air observations). The meteorological data was determined to be representative of the weather conditions at the proposed construction site.

An emissions inventory of all increment consuming and other sources within 50 km of the proposed plant; and new sources within 100 km of the nearest Class I area was compiled. For the purpose of the modeling analysis, the main steam generating units were considered to operate continuously. This is a conservative assumption because the plant capability factor is expected to be no greater than 74 percent.

An initial modeling analysis determined that the 1973 meteorological data represented the "worst-case" year assuming a 100 percent plant load. Additional modeling at 75 percent and 50 percent load showed that a 100 percent continuous operating load resulted in the highest ground level concentrations. Therefore, the more detailed analyses were conducted using the emission parameters for the 100 percent load level. All modeling was conducted using EPA-approved modeling techniques. All stacks were modeled at Good Engineering Practice (GEP) stack height. No effects on the projected ambient air concentrations of pollutants were expected to occur as a result of turbulent building wake effects (downwash) because all stacks met GEP stack height.

The maximum ambient air concentrations for the pollutants under review were determined by modeling emissions from the proposed new source along with emissions from the JEA Northside plant and St. Regis Paper Company. The maximum concentrations obtained from the modeling analysis were added to the maximum monitored concentrations (which did not include contributions from the St. Regis Paper Company or the JEA Northside plant) to obtain the maximum ambient air concentrations of each pollutant under review. This analysis is considered conservative because both the maximum monitored and modeled concentrations were not located at the same geographical point. The results of the NAAQS analysis are presented in Table 3.

A modeling analysis was conducted to determine the impact of PM emissions (including fugitive PM emissions) from the proposed new source on the PM non-attainment area located in the downtown Jacksonville, Florida area. The maximum impacts were projected to be below 1 ug/m^3 on an annual average and 5 ug/m^3 on a 24-hr average. These values are below the PSD modeling significance levels as defined in the June 19, 1978 PSD regulations, 43FR26358. Therefore, the proposed new source will not significantly impact the PM non-attainment area which is in compliance with the August 7, 1980 PSD regulations paragraph (f)(4)(a).

The VOC emissions from the proposed new source are not expected to impact the ozone non-attainment area located near Jacksonville, Florida. Presently, no EPA-approved dispersion models exist with which to model ozone emissions (of which VOC is a precursor). The VOC emission levels from the proposed new source are small and therefore are not expected to significantly impact the ozone non-attainment area under any meteorological conditions.

D. Increment Analysis

The models and meteorology for determination of PM and SO_2 increment consumption were the same as those discussed in the NAAQS analysis (above). All increment consuming sources potentially affecting the ambient air quality in the area of the proposed new source were included in the modeling analysis. No violations of the Class II increment standards were predicted. The results are presented in Table 4.

E. Growth Analysis

The proposed new source is expected to directly employ about 400 people. Most of these workers will come from the local work force. No air quality impacts resulting from industrial, commercial, or residential growth associated with the proposed new source are expected.

F. Soils, Vegetation and Visibility Analysis

No soils vegetation or visibility impacts are expected to occur due to emissions from the proposed new source because of the relatively small increase in ambient pollutant concentrations.

G. Class I Area Analysis

The nearest Class I area to the proposed new source is the Okefenokee Swamp whose borders are located between 61 and 73 kilometers in a northwestly direction. The models and meteorology used in the increment and NAAQS analyses were utilized to predict the maximum SO_2 and PM increment consumption at the borders of the Class I area. All increment consuming sources potentially impacting the Class I area were included in the modeling analysis. Five years of meteorological data were modeled. No violations of the Class I increments were predicted. The results are presented in Table 5.

No impacts on Class I area soils, vegetation or visibility are expected due to the low level of ambient air concentrations projected in the Class I area for any pollutant under review. The results of this analysis will be forwarded to the Federal Land Managers responsible for this Class I area for comment on the significance of the Class I impacts.

V. Conclusion

EPA proposes a final determination of approval with conditions for construction of the steam electric generating station proposed by the Jacksonville Electric Authority. This determination is based upon the application received May 28, 1980 and additional information dated July 8, 1980 and November 26, 1980 (application determined complete as of July 9, 1980). The determination of approval is contingent upon the following specific conditions:

1. The proposed steam generating station will be constructed and operated in accordance with the capabilities and specifications of the application including the 600 megawatt generating capacity and the 6144 MMBtu/hr heat input rate for each steam generator.

2. Emissions will not exceed the allowable emissions listed in Table 6 for SO_2, PM, and NO_x.

3. Compliance with the allowable emission limits for emission points 1, 2, and 3 in Table 6 will be demonstrated with performance tests conducted in accordance with the provisions of 40 CFR 60.46a, 48a and 49a, including applicable test methods, sampling procedures, sample volumes, sampling periods, etc.

   Compliance with the emission limitations of all emission points in Table 6 will be in accordance with 40 CFR 60, Appendix A; Method 5, Determination of Particulate Emissions from Stationary Sources; Method 6, Determination of Sulfur Dioxide Emissions from Stationary Sources; Method 7, Determination of Nitrogen Oxide Emissions from Stationary Sources; Method 9, Determination of the Opacity of Emissions from Stationary Sources; and Method 10, Determination of Carbon Monoxide Emissions from Stationary Sources.

   Emission points 4 thru 13 of Table 6 are exempted from mass emission rate compliance tests unless opacity limits are exceeded or the Administrator (or his representative) otherwise determines that such performance testing is required. All facilities will operate within 10 percent of maximum operating capacity during performance testing.

4. A flue gas oxygen meter shall be installed in emissions points 1, 2, and 3 of Table 6 to continuously monitor a representative sample of the flue gas.

   Also the applicant will install and maintain a continuous monitoring and recording opacity meter, sulfur dioxide, nitrogen oxide and carbon monoxide analyzers for each steam generator (emissions units 1 and 2 of Table 6) in accordance with the provisions of 40 CFR 60.47a.

5. Emission points 1 and 2 of Table 6 shall fire coal with an ash content not to exceed 18% and a sulfur content not to exceed 4% by weight. Coal sulfur content shall be determined and recorded in accordance with 40 CFR 60.47a.

   Emission point 3 of Table 6 shall fire No. 2 fuel oil with a maximum sulfur content of .7 percent by weight and a maximum ash content of .01 percent by weight. Samples of all fuel oil fired in the boilers shall be taken and analyzed for sulfur and ash content. Accordingly, samples shall be taken of each fuel oil shipment received. Records of the analyses shall be recorded and kept for public inspection for a minimum of two years after the data is recorded.

6. The following requirements will be met to minimize fugitive emissions of particulate from the coal storage and handling facilities, the limestone storage and handling facilities, haul roads and general plant operations:

   a. All conveyors and conveyor transfer points will be enclosed to preclude PM emissions (except those directly associated with the coal stacker/reclaimer for which enclosure is operationally infeasible).

   b. Inactive coal storage piles will be shaped, compacted and oriented to minimize wind erosion;

   c. Water sprays or chemical wetting agents and stabilizers will be applied to storage piles, handling equipment, etc. during dry periods and as necessary to all facilities to maintain an opacity of less than or equal to 10 percent.

   d. Limestone handling will be from bottom dump rail car delivery with wet dust suppression, and open storage or dry storage silos.

   e. The fly ash handling system (including transfer and silo storage) will be totally enclosed and vented (including pneumatic system exhaust) through fabric filters.

7. Maximum emissions of carbon monoxide will be determined during performance testing for compliance with nitrogen oxide emissions (NSPS - 40 CFR 60.44a.). The upper limit of carbon monoxide emissions shall be that emission rate where the nitrogen oxides emission is recorded at its lowest emission rate (to be not greater than that required by NSPS (40 CFR 60.44a.).

8. The applicant will comply with all requirements and provisions of the New Source Performance Standard for electric utility steam generating units (40 CFR 60 Part Da). In addition, the applicant must comply with the provisions and the requirements of the attached General Conditions.

9. As a requirement of this specific condition, the applicant will comply with all emissions limits and enforceable restrictions required by the State of Florida Department of Environmental Regulation which are more restrictive. That is, lower emissions limits or more strict operating requirements and equipment specifications than the requirements of specific conditions 1-9 of this permit.

10. This PSD approval to construct shall be valid only in the event that the stacks at the Southside (units1-4) and Kennedy(units 8,9,10) plants are raised to 84 meters as presented in the ambient air quality analysis for this determination; or additional modeling of air quality impacts is submitted which demonstrate that the NAAQS will not be violated at the lower stack height under valid worst case conditions. If such modeling is to be used to show compliance with NAAQS it should be submitted prior to construction of the new units at the St. Johns River Power Park.

Table 1. EMISSIONS SUMMARY OF THE PROPOSED JEA POWER GENERATING PLANT

Pollutant	Potential Emissions[a] (Tons per Year)	PSD Significance Levels (Tons per Year)
SO_2	41900	40
PM	1626	25
NO_x	32967	40
CO	2990	100
VOC	28[b]	40

[a] Potential emissions calculations are based on a continuous maximum operating capacity.

[b] Applicant estimated 0.0005 lb VOC/MMBtu (27 tons/yr) average emissions rate from the boilers.

Table 2. FUGITIVE EMISSIONS AND CONTROL SUMMARY

Process	Type	Amount	Factor	Control	Technique	Emissions (Grams/Sec)
Ship Unloading	Grab Bucket	10,000 Tons/Day	.4LB/Ton[a]	(99.9%)[b]	Dry Collection on Hoppers	.04
Ship Unloading Transfer Points	6 Points	10,000 Tons/Day	.2LB/Ton[a]	(99.9%)[b]	Dry Collection	.06
Ship Unloading Transfer Points	3 Points	10,000 Tons/Day	.2LB/Ton[a]	(97%)[b]	Wet Suppression	.95
Ship Unloading Facility Train	Loading Shed	10,000 Tons/Day	.4LB/Ton[a]	(99.9%)[b]	Dry Collection	.02
Ship Unloading Facility Coal Surge Pile	Active	30 Acres	13LB/Acre/Day[a]	(90%)[a]	Wetting Agents	.20
Rail Car Unloading	Rotary Dumper	10,000 Tons/Day	.4LB/Ton[a]	(97%)[b]	Wet Suppression	.63
Coal Handling Transfer Points	2 Points	10,000 Tons/Day	.2LB/Ton[a]	(99.9%)[b]	Dry Collection	.02
Coal Handling Transfer Points	2 Points	3,300 Tons/Day	.2LB/Ton[a]	(99.9%)[b]	Dry Collection	.01
Coal Handling Transfer Points	6 Points	3,300 Tons/Day	.2LB/Ton[a]	(97%)[b]	Wet Suppression	.62
Coal Handling Transfer Points	7 Points	5,000 Tons/Day	.2LB/Ton[a]	(99.9%)[b]	Dry Collection	.04
Coal Storage at Plant	Active	8 Acres	13LB/Acre/Day[a]	(90%)[a]	Wetting Agents	.05
Coal Storage at Plant	2 Inactive Piles	15 Acres Each	3.5LB/Acre/Day[a]	(99%)[b]	Wetting Agents	.01
Limestone Unloading	Rail Dumper	750 Tons/Day	.4LB/Ton[a]	(97%)[b]	Wet Suppression	.002
Limestone Tranfer Point	1 Point	750 Tons/Day	.2LB/Ton[a]	(99.9%)[b]	Dry Collection	.001
Cooling Towers	Drift	2x603 Grams/Sec	32,963 ppm Solids	21%<50 Microns	Drift Eliminators	8.4

[a] (Pedco, 1977)
[b] (Stoughton, 1980)

Table 3. NAAQS ANALYSIS

Pollutant/ averaging time	Monitored[a] background concentration (ug/m^3)	Maximum[b] projected concentration (ug/m^3)	Total concentration (ug/m^3)	NAAQS (ug/m^3)
SO_2				
3-hour	123	1010	1133	1,300
24-hour	45	193	238	365
annual	11	13	24	80
PM				
24-hour	79	27	106	150
annual	37	3	40	75
NO_2				
annual	15	10	25	100
CO				
1-hour	--[c]	108[d]		40,000
8-hour	--[c]	<100[d]		20,000

[a] These values do not include contributions from the JEA Northside Plant and the St. Regis Paper Co.

[b] These concentrations include contributions from the proposed JEA steam electric generating station, the existing JEA Northside Plant and the existing St. Regis Paper Co.

[c] CO monitoring data was not available. However, because of the low ambient air concentrations of CO projected, no violations of the NAAQS for CO is expected.

[d] These values were estimated from the projected SO_2 ambient air concentrations based on worst-case operating load and meteorological conditions.

Table 4. CLASS II INCREMENT ANALYSIS

Pollutant/ averaging time	Maximum[a] Class II increment consumption (ug/m^3)	PSD Class II increment (ug/m^3)
SO_2		
3-hour	357	512
24-hour	48	91
annual	2	20
PM		
24-hour	17	37
annual	2.3	19

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[a] These values include contributions from all increment consuming sources impacting the ambient air quality within 50 kilometers of the proposed new source, including the proposed JEA steam electric generating station. Five years of meteorological data was used in the analysis; therefore, these values represent the highest, second highest concentrations.

Table 5. CLASS I INCREMENT ANALYSIS

Pollutant/ averaging time	Maximum[a] Class I increment consumption (ug/m^3)	PSD Class I increment (ug/m^3)
SO_2		
3-hour	18	25
24-hour	4	5
annual	<1	2
PM		
24-hour	<1	5
annual	<1	10

[a] These values include contributions from all increment consuming sources within 100 kilometers of the Class I area including the proposed JEA electric steam generating station. Five years of meteorological data was used in the analysis; therefore, these values represent the highest, second highest concentrations.

Table 6. ALLOWABLE EMISSION LIMITS
(lb/hour; lb/MMBtu)

Emission Unit	SO_2	NO_x	PM	Opacity (Percent)
1. Steam generating boiler no. 1 (6,144 MMBtu/hr maximum heat input)	4,669; 0.76 (30 day rolling average)	3,686; 0.6	184; 0.03	20
2. Steam generating boiler no. 2 (6,144 MMBtu/hr maximum heat input)	4,669; 0.76 (30 day rolling average)	3,686; 0.6	184; 0.03	20
3. Auxiliary boilers (254 MMBtu/hr maximum heat input total)	203; 0.8	76; 0.3	2.5; 0.01	20
4. Ship unloading (Grab Bucket)			0.32	10
5. Ship unloading transfer points (6 dry collection points)			0.1 (ea.)	10
6. Ship unloading (3 wet suppression points)			7.5	10
7. Ship unloading facility train (loading shed)			0.2	10
8. Ship unloading facility coal storage pile (30 acres)			1.5	10

Table 6. ALLOWABLE EMISSION LIMITS
(lb/hour; lb/MMBtu)
(continued)

Emission Unit	SO_2	NO_x	PM	Opacity (Percent)
9. Rail car unloading (Rotary Dumper)			5	10
10. Coal handling transfer points (wet suppression points and dry collection)			5 (each)	10
11. Coal handling transfer points (11 wet suppression points)			0.1 (each)	10
12. Coal storage at plant (8 acres active)			0.4	10
13. Coal storage at plant (2-15 acre inactive piles)			0.1	10
14. Limestone unloading (rail dumper)			0.1	10
15. Limestone transfer points			0.1 (each)	10
16. Cooling towers			67 (each tower)	N/A

GENERAL CONDITIONS

1. The permittee shall notify the permitting authority in writing of the beginning of construction of the permitted source within 30 days of such action and the estimated date of start-up of operation.

2. The permittee shall notify the permitting authority in writing of the actual start-up of the permitted source within 30 days of such action and the estimated date of demonstration of compliance as required in the specific conditions.

3. Each emission point for which an emission test method is established in this permit shall be tested in order to determine compliance with the emission limitations contained herein within sixty (60) days of achieving the maximum production rate, but in no event later than 180 days after initial start-up of the permitted source. The permittee shall notify the permitting authority of the scheduled date of compliance testing at least thirty (30) days in advance of such test. Compliance test results shall be submitted to the permitting authority within forty-five (45) days after the complete testing. The permittee shall provide (1) sampling ports adequate for test methods applicable to such facility, (2) safe sampling platforms, (3) safe access to sampling platforms, and (4) utilities for sampling and testing equipment.

4. The permittee shall retain records of all information resulting from monitoring activities and information indicating operating parameters as specified in the specific conditions of this permit for a minimum of two (2) years from the date of recording.

5. If, for any reason, the permittee does not comply with or will not be able to comply with the emission limitations specified in this permit, the permittee shall provide the permitting authority with the following information in writing postmarked within five (5) days of such conditions:

   (a) description of noncomplying emission(s),

   (b) cause of noncompliance,

   (c) anticipated time the noncompliance is expected to continue or, if corrected, the duration of the period of noncompliance,

   (d) steps taken by the permittee to reduce and eliminate the noncomplying emission,

   and

   (e) steps taken by the permittee to prevent recurrence of the noncomplying emission.

   Failure to provide the above information when appropriate shall constitute a violation of the terms and conditions of this permit. Submittal of this report does not constitute a waiver of the emission limitations contained within this permit.

6. Any change in the information submitted in the application regarding facility emissions or changes in the quantity or quality of materials processed that will result in new or increased emissions must be reported to the permitting authority. If appropriate, modifications to the permit may then be made by the permitting authority to reflect any necessary changes in the permit conditions. In no case are any new or increased emissions allowed that will cause violation of the emission limitations specified herein.

7. In the event of any change in control or ownership of the source described in the permit, the permittee shall notify the succeeding owner of the existence of this permit by letter and forward a copy of such letter to the permitting authority.

8. The permittee shall allow representatives of the State environmental control agency and/or representatives of the Environmental Protection Agency, upon the the presentation of credentials:

   (a) to enter upon the permittee's premises, or other premises under the control of the permittee, where an air pollutant source is located or in which any records are required to be kept under the terms and conditions of the permit;

   (b) to have access to and copy at reasonable times any records required to be kept under the terms and conditions of this permit, or the Act;

   (c) to inspect at reasonable times any monitoring equipment or monitoring method required in this permit;

   (d) to sample at reasonable times any emission of pollutants;

   and

   (e) to perform at reasonable times an operation and maintenance inspection of the permitted source.

9. All correspondence required to be submitted by this permit to the permitting agency shall be mailed to the:

   Chief, Consolidated Permits Branch
   Enforcement division
   U. S. Environmental Protection Agency
   Region IV
   345 Courtland Street
   Atlanta, Georgia 30365

10. The conditions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

The emission of any pollutant more frequently or at a level in excess of that authorized by this permit shall constitute a violation of the terms and conditions of this permit.

USE OF FLUE GAS OXYGEN METER AS BACT FOR COMBUSTION CONTROLS

Within the time limits specified in General Condition 3 of this permit, the permittee shall determine the emissions of nitrogen oxides and carbon monoxide from the permitted combustion device in accordance with test methods and procedures set out in 40 CFR Part 60, Appendix A, Methods 7 and 10, respectively. These emission determinations shall be made at:

1) Maximum design capacity; and
2) Normal operational load.

The permittee shall install a continuous oxygen monitor in the flue of the permitted combustion device which meets the requirements of 40 CFR Part 60, Appendix B, Performance Specification 3. Results of emission determinations shall be correlated to the flue gas oxygen content to define:

1) The point at which Nitrogen Oxides (NO_x) emissions (lb/MMBtu) equals the allowable NO_x emission rate contained in the permit.
2) The point at which carbon monoxide (CO) emissions exceed the allowable CO emission rate contained in the permit.

The flue gas oxygen content shall be maintained between these points and alarms shall be set to sound when flue gas oxygen levels exceed either side of this range.

Should any combustion equipment modifications be made such as different type burners, combustion air relocation, fuel conversion, tube removal or addition, etc., emissions correlations as described above shall be conducted within 90 days of attaining full operation after such modification. Results of all emission determinations shall be sent to the permitting authority within 90 days after completion of the tests.

APPENDIX B

NPDES PERMIT (DRAFT) (USEPA) INCLUDING PERMIT RATIONALE

DRAFT
10/29/81

Permit No.: FL0037869

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended (33 U.S.C. 1251 et. seq; the "Act"),

Jacksonville Electric Authority
233 West Duval Street
Jacksonville, Florida 32201

is authorized to discharge from a facility located at

St. Johns River Power Park
Units 1 and 2
11201 New Berlin Road
Jacksonville, Florida 32226

to receiving waters named St. Johns River and Browns Creek from discharge points enumerated herein as serial numbers 001 through 008.

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, and III hereof. The permit consists of this cover sheet, Part I 16 pages(s), Part II 12 page(s) and Part III 4 page(s).

This permit shall become effective on

This permit and the authorization to discharge shall expire at midnight, (5 years)

Date Signed

DRAFT
OCT 2 4 1981

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge and lasting through expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 001 - Main Plant Discharge to the Northside Generating Station (NPDES No. FL0001031) Discharge Channel (to the St. Johns River).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations		Monitoring Requirements	
	Inst. Maximum	Daily Maximum	Measurement Frequency	Sample Type
Temperature °C (°F)	N/A	33.9 (93.0)	Continuous	Recorder
Total Residual Oxidants(mg/l)	0.10	NA	1/week 1/	Multiple Grabs
Additional Monitoring	See Part III.C.		1/month	24-hour composite

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week on a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Main Plant Discharge prior to entry into the Northside Discharge Channel, except that chlorine shall be monitored at the end of the Northside Discharge Channel.

1/ From start of chlorination of each unit, analyses shall follow each application until sufficient operating experience has been obtained to assure conformance with limitations and then analysis frequency may be reduced to one day per week.

DRAFT

OCT 29 1981

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge and lasting through expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 002 - Runoff Sedimentation Control Pond discharge to Browns Creek (includes construction and yard drainage, effluent from Concrete Truck Washing Settling Pond and Sanitary Wastewater Treatment Facility effluent (OSN 003)).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations	Monitoring Requirements	
	Instantaneous Maximum	Measurement Frequency	Sample Type
Flow-m^3/Day (MGD)	N/A	1/week	Grab
Total Suspended Solids (mg/l)	50 1/	1/week	Grab
Oil and Grease	5.0	1/week	Grab
Total Residual Chlorine (mg/l)	0.01	1/week	Multiple Grabs
Detention Volume	See Below	1/month	Calculations

The runoff treatment pond shall be capable of containing the 10-year, 24-hour rainfall event (61 acre-feet) plus all accumulated silt. Not less than once per month, permittee shall ascertain that available settling volume meets this requirement and shall report this finding when submitting Discharge Monitoring Reports.

To the extent practicable, water for concrete truck washing shall be recycled from the concrete washing settling pond.

The pH shall not be less than 6.0 standard units nor greater than 8.5 standard units and shall be monitored 1/week by grab sample 1/.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): point of discharge from the Runoff Sedimentation Control Pond.

1/ Applicable to any flow up to the flow resulting from a 24-hour rainfall event with a probable recurrence interval of once in ten years.

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge and lasting through expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 003 1/ - Sanitary Wastewater Treatment Facility effluent (Two units in parallel) to OSN 002 during construction of Unit 1 and OSN 001 during operation.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations		Monitoring Requirements	
	Daily Average (mg/l except as noted)	Daily Maximum	Measurement Frequency	Sample Type
Flow-m^3/Day (MGD)	N/A	114 (0.030) 2/	2/week	Grab
BOD$_5$	30	60	2/month	Grab
Total Suspended Solids	30	60	2/month	Grab
Total Residual Chlorine 3/	N/A	N/A	2/week 3/	Grab 3/

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 2/week by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Combined sewage treatment plant effluent prior to mixing with any other waste stream.

1/ Serial number assigned for identification and monitoring purposes.

2/ Neither unit shall be loaded at greater than one-half the value shown.

3/ Applicable only during periods of discharge to OSN 002.

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge and lasting through expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 004 - Coal Pile Runoff Sedimentation Pond overflow to Browns Creek.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations		Monitoring Requirements	
	Daily Average	Daily Maximum	Measurement Frequency	Sample Type
Flow-m^3/Day (MGD)	N/A	N/A	During Occurrence	Estimate
Monitoring (See Part III.C.)	N/A	N/A	During Occurrence	Representative

Discharge to Browns Creek is not permitted except when flow results from a 24-hour rainfall event with a probable recurrence interval of once in ten years (10Q24) or greater. All periods of discharge shall be reported.

Discharge of water from the plant main pump sump to the coal pile runoff sedimentation pond is permitted during periods when the pH of OSN 006 is not within permitted limitations, provided that available excess detention volume not less than that required for a 10Q24 storm is maintained. Water level interlocks or other acceptable positive methods shall be provided to assure control. A report defining the proposed control measures shall be submitted not later than 12 months prior to commercial operation date of Unit 1.

The pH shall be monitored during discharge by representative grab samples.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Discharge from the coal pile runoff sedimentation pond.

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.. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge and lasting through expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 005 1/ - Unit 1 and 2 Cooling Tower Blowdowns to OSN 001.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations (mg/l unless noted) Chlorination Period		Monitoring Requirements	
	Average	Inst. Max.	Measurement Frequency	Sample Type
Flow-m^3/Day (MGD)	N/A	N/A	Daily	Pump logs
Free Available Oxidants - FAO	See Below		1/week 2/	Multiple Grabs
Total Residual Oxidants - TRO	See Below		1/week 2/	Multiple Grabs
Time of TRO discharge (minutes/day/tower)	See Below		1/week 2/	Determinations
Cycles of Concentration	See Below		1/day	Calculation

Until the date noted in the next paragraph, FAO shall not exceed an average concentration of 0.2 mg/l nor a maximum of 0.5 mg/l in the blowdown from either cooling tower during all periods of FRO discharge during any day. Neither FAO nor TRO may be discharged from either cooling tower for more than two hours in any one day and not more than one tower from either unit may discharge FAO or TRO at any time unless the permittee can satisfactorily demonstrate to the regional administrator that the units cannot operate at or below this level of chlorination. TRO shall not be discharged during periods when TRO is being discharged from any unit at Northside Generating Station.

Not later than three years afer promulgation or July 1, 1987, whichever is earlier, TRO shall not exceed a maximum concentration of 0.14 mg/l in the combined cooling tower blowdown discharge. TRO shall not be discharged for more than two hours per day. Note: In the event that BAT regulations for control of TRO or chlorine are promulgated in a manner inconsistent with the October 14, 1980, proposed guidelines, requirements of this paragraph will be modified consistent with the promulgated regulations (40 CFR 423).

There shall be no discharge of detectable amounts of materials added for corrosion inhibition (including, but not limited to, zinc, chromium or phosphorus) or any chemicals added which contain the 129 priority pollutants.

Cycles of concentration shall not exceed 1.5 and shall be calculated by dividing the 24-hour average intake flow by the 24-hour average blowdown flow for each tower.

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge and lasting through expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 005 1/ - Unit 1 and 2 Cooling Tower Blowdowns to OSN 001. (Continued)

The permittee shall notify the Director, Enforcement Division in writing not later than four months prior to instituting use of any biocide or chemical used in cooling systems, other than chlorine, which may be toxic to aquatic life, other than those previously reported to the Environmental Protection Agency. Such notification shall include:

1. name and general composition of biocide or chemical,
2. 96-hour median tolerance limit data for organisms representative of the biota of the waterway into which the discharge shall occur,
3. quantities to be used,
4. frequencies of use,
5. proposed discharge concentrations, and
6. EPA registration number, if applicable.

The pH shall not be less than NA standard units nor greater than NA standard units and shall be monitored NA.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Discharge from each of the cooling towers prior to mixing with other waste streams.

1/ Serial number assigned for identification and monitoring purposes.

2/ From start of chlorination of each unit, analyses shall follow each application of chlorine until sufficient operating experience has been obtained to assure conformance with limits and then analysis frequency may be reduced to one day per week.

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EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning 1/ and lasting through 2/, the permittee is authorized to discharge from outfall(s) serial number(s) 006 3/ - Unit 1 Central Wastewater Treatment Facility effluent to OSN 001.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations kg/day (lbs/day) Daily Avg	Discharge Limitations kg/day (lbs/day) Daily Max	Other Units (mg/l) (except as noted) Daily Ave	Other Units (mg/l) (except as noted) Daily Avg.	Monitoring Requirements Measurement Frequency	Monitoring Requirements Sample Type
Flow-m3/Day (MGD)	N/A	N/A	N/A	N/A	Continuous	Recorder
Total Suspended Solids	130(280)	210(470)	30	50	2/week	24-hour composite
Oil and Grease	45(100)	60(130)	105/	155/	2/week	3-grab composite
Aluminum	N/A	N/A	N/A	6/	4/	24-hour composite
Copper	N/A	N/A	N/A	6/	4/	24-hour composite
Cyanide	N/A	N/A	N/A	6/	4/	24-hour composite
Iron	N/A	N/A	N/A	6/	4/	24-hour composite
Mercury	N/A	N/A	N/A	6/	4/	24-hour composite
Nickel	N/A	N/A	N/A	6/	4/	24-hour composite
Selenium	N/A	N/A	N/A	6/	4/	24-hour composite
Silver	N/A	N/A	N/A	6/	4/	24-hour composite
Zinc	N/A	N/A	N/A	6/	4/	24-hour composite
Additional Monitoring	See Part III.C.				4/	24-hour composite

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored by continuous recorder.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Discharge from the central wastewater treatment facility prior to mixing with any other waste stream, except that pH, metals and additional monitoring shall be from the Pump Sump. Daily flow records of both the discharge from the Flow Equalization Basin and Coal Pile Runoff Sedimentation Pond also shall be maintained by pump hour recorders.

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning 1/ and lasting through 2/,
the permittee is authorized to discharge from outfall(s) serial number(s) 006 3/ - Unit 1 Central Wastewater Treatment Facility effluent to OSN 001. (Continued)

1/ Start of discharge from Unit 1.

2/ Start of discharge from Unit 2.

3/ Serial number assigned for identification and monitoring purposes.

4/ Once per week for the first six months after commercial operation date of Unit 1, once per two weeks for the next six months and once per month thereafter unless the Director of the Enforcement Division determines that analysis results indicate the need for a greater measurement frequency. All data shall be submitted monthly for the first six months of plant operation (and summarized quarterly in DMR's).

5/ During periods when coal pile runoff is not being processed, limitations shall be 15 and 20 mg/l, respectively.

6/ Value to be included depending upon the findings of variance hearings and approval of any variance by EPA.

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EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning 1/ and lasting through expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 006 2/ - Units 1 and 2 Central Wastewater Treatment Facility effluent to OSN 001.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations				Monitoring Requirements	
	kg/day (lbs/day)		Other Units (mg/l) (except as noted)			
	Daily Avg	Daily Max	Daily Avg	Daily Max	Measurement Frequency	Sample Type
Flow-m^3/Day (MGD)	N/A	N/A	N/A	N/A	Continuous	Recorder
Total Suspended Solids	220(480)	360(800)	30	50	2/week	24-hour composite
Oil and Grease	90(200)	120(270)	10 3/	15 3/	2/week	3-grab composite
Aluminum	N/A	N/A	N/A	5/	4/	24-hour composite
Copper	N/A	N/A	N/A	5/	4/	24-hour composite
Cyanide	N/A	N/A	N/A	5/	4/	24-hour composite
Iron	N/A	N/A	N/A	5/	4/	24-hour composite
Mercury	N/A	N/A	N/A	5/	4/	24-hour composite
Nickel	N/A	N/A	N/A	5/	4/	24-hour composite
Selenium	N/A	N/A	N/A	5/	4/	24-hour composite
Silver	N/A	N/A	N/A	5/	4/	24-hour composite
Zinc	N/A	N/A	N/A	5/	4/	24-hour composite
Additional Monitoring	See Part III.C.				4/	24-hour composite

During periods of metal cleaning, quantity limitations from this source shall be one-half of those noted above (but is increased by the actual quantities of metal cleaning waste pollutants being discharged from OSN 007).

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored by continuous recorder.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Discharge from the central wastewater treatment facility prior to mixing with any other waste stream, except that pH, metals and additional monitoring shall be from the Pump Sump. Daily flow records of both the discharge from the Flow Equalization Basin and Coal Pile Runoff Sedimentation Pond also shall be maintained by pump hour recorders.

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning 1/ and lasting through expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 006 2/ - Units 1 and 2 Central Wastewater Treatment Facility effluent to OSN 001. (Continued)

1/ Start of discharge from Unit 2.

2/ Serial number assigned for identification and monitoring purposes.

3/ During periods when coal pile runoff is not being processed, limitations shall be 15 and 20 mg/1, respectively.

4/ Once per two weeks for the first six months after commercial operation date of Unit 2 and once per month thereafter unless the Director of the Enforcement Division determines that analysis results indicate the need for a greater measurement frequency.

5/ Value to be included depending upon the findings of variance hearings and approval of any variance by EPA.

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge and lasting through expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 007 1/ - Metal Cleaning Wastes from Units 1 and 2 to OSN 001.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			Monitoring Requirements	
	kg (lbs) per batch	Other Units (mg/l) . (except as noted) Daily Avg	Daily Max	Measurement Frequency	Sample Type
Flow-m^3/Day (MGD)	N/A	N/A	N/A	Continuous	Recorder or pump logs
Total Suspended Solids	2/	30	100	1/Day	24-hour composite
Oil and Grease	2/	15	20	1/Day	3-grab composite
Copper, Total	2/	1.0	1.0	1/Day	24-hour composite
Iron, Total	2/	1.0	1.0	1/Day	24-hour composite
Phosphate as PO_4	2/	N/A	1.0 3/	1/Day	24-hour composite
Chemical Oxygen Demand	2/	N/A	100 4/	1/Day	24-hour composite
Additional Monitoring		See Part III.C.		1/batch	24-hour composite

Metal cleaning wastes shall mean any cleaning compounds, rinse waters (including water wash operations), or any other waterborne residues derived from cleaning any metal process equipment including, but not limited to, boiler tube cleaning, boiler fireside cleaning and air preheater cleaning.

Metal cleaning wastes shall not be combined with other plant wastes for treatment, except for final neutralization.

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored by continuous recorder as provided for OSN 006.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Discharge from the sand filter(s) treating metal cleaning wastes prior to combining with any other waste stream.

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge and lasting through expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 007 1/ - Metal Cleaning Wastes from Units 1 and 2 to OSN 001. (Continued)

1/ Serial number assigned for identification and monitoring purposes.

2/ The total quantity of each pollutant discharged shall be reported. In no case shall the quantity discharged exceed the quantity determined by multiplying the volume of the batch of metal cleaning waste generated times the concentrations noted above [i.e., 3.8 kg (8.3 lbs) of iron, copper, and phosphate; 57 kg (125 lbs) of oil and grease; and 114 kg (250 lbs) of total suspended solids per million gallons of metal cleaning waste generated]. Total volume of wastewater generated and discharged shall be reported.

3/ Applicable to preoperational cleaning wastes and other cleaning wastes with high initial concentration of phosphate.

4/ Applicable to any cleaning operation containing organic acids, chelating agents or other compounds with high oxygen demand.

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge and lasting through expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 008 1/ - Oily Water Collection Basin effluent to OSN 001.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations		Monitoring Requirements	
	Daily Avg	Daily Max	Measurement Frequency	Sample Type
Flow-m^3/Day (MGD)	N/A	N/A	Daily	Pump hour meter
Total Suspended Solids (mg/l)	30	100	2/week	3-grab composite
Oil and Grease (mg/l)	15	20	2/week	3-grab composite

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 2/week on a grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Basin effluent prior to mixing with any other waste source.

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge and lasting through expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 009 - Solid Waste Runoff Sedimentation Pond overflow to Browns Creek.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations	Monitoring Requirements	
		Measurement Frequency	Sample Type
Flow-m^3/Day (MGD)	N/A	During Occurrence	Estimate
Monitoring (See Part III.C.)	N/A	During Occurrence	Representative

Discharge to Browns Creek is not permitted except when flow results from a 24-hour rainfall event with a probable recurrence interval of once in 10 years (10Q24) or greater. All periods of discharge shall be reported.

Any runoff settling pond shall be capable of containing the 10Q24 rainfall event from all tributary areas plus all accumulated silt. Not less than once per quarter, permittee shall ascertain that available settling volume meets this requirement and shall report this finding when submitting Discharge Monitoring Reports.

The pH shall be monitored during discharge by representative grab samples.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Solid Waste Sedimentation Pond overflow.

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A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on start of discharge from OSN 005 or 006, whichever occurs earlier, and lasting through expiration, the permittee shall monitor serial number 010 1/ - Plant Intake from Northside Discharge Channel.

Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow-m^3/Day (MGD)	Continuous	Recorder or Logs
Additional Monitoring (See Part III.C)	1/month	24-hour composite

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): Plant Intake.

1/ Serial number assigned for identification and monitoring purposes.

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B. SCHEDULE OF COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

    a. Achieve effluent limitations (001-009) - on start of discharge

    b. Excess Volume Control Report (004) - 12 months prior to commercial operation date of Unit 1

    c. Flow reports (Part III.D.)
        (1) First report - 15 months after commercial operation date of Unit 1
        (2) Second report - 15 months after commercial operation date of Unit 2

    d. Priority pollutant data (Part III.K.) - Submit by 12 months after commercial operation date of Unit 1

    e. Solid waste landfill permeability (Part III.O.)
        (1) Permeability Rate test - 90 days prior to use of any solid waste landfill area(s)

    f. FGD water supply assessment (Part III.R.)
        (1) Report - 180 days after determination that gypsum is not saleable (if such determination is ever necessary)

    g. Groundwater Monitoring Program (Part III.S.)
        (1) Implement - 12 months prior to commercial operation date of Unit 1
        (2) Reports - Quarterly with DMR's

    h. Effluent Bioassay Program (Part III.T.)
        (1) Detailed Study Plan - six months prior to commercial operation date of Unit 1
        (2) Implement - commercial operation date of Unit 1
        (3) Reports
            (a) screening tests - quarterly with DMR's
            (b) quarterly tests - quarterly with DMR's

2. No later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

A. MANAGEMENT REQUIREMENTS

1. Discharge Violations

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant more frequently than, or at a level in excess of, that identified and authorized by this permit constitutes a violation of the terms and conditions of this permit. Such a violation may result in the imposition of civil and/or criminal penalties as provided in Section 309 of the Act.

2. Change in Discharge

Any anticipated facility expansions, production increases, or process modifications which will result in new, different, or increased discharges of pollutants must be reported by submission of a new NPDES application at least 180 days prior to commencement of such discharge. Any other activity which would constitute cause for modification or revocation and reissuance of this permit, as described in Part II (B) (4) of this permit, shall be reported to the Permit Issuing Authority.

3. Noncompliance Notification

a. Instances of noncompliance involving toxic or hazardous pollutants should be reported as outlined in Condition 3c. All other instances of noncompliance should be reported as described in Condition 3b.

b. If for any reason, the permittee does not comply with or will be unable to comply with any discharge limitation specified in the permit, the permittee shall provide the Permit Issuing Authority with the following information at the time when the next Discharge Monitoring Report is submitted.

   (1) A description of the discharge and cause of noncompliance;
   (2) The period of noncompliance, including exact dates and times and/or anticipated time when the discharge will return to compliance; and
   (3) Steps taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

c. Toxic or hazardous discharges as defined below shall be reported by telephone within 24 hours after permittee becomes aware of the circumstances and followed up with information in writing as set forth in Condition 3b. within 5 days, unless this requirement is otherwise waived by the Permit Issuing Authority:

(1) Noncomplying discharges subject to any applicable toxic pollutant effluent standard under Section 307(a) of the Act;
(2) Discharges which could constitute a threat to human health, welfare or the environment. These include unusual or extraordinary discharges such as those which could result from bypasses, treatment failure or objectionable substances passing through the treatment plant. These include Section 311 pollutants or pollutants which could cause a threat to public drinking water supplies.

d. Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

4. Facilities Operation

All waste collection and treatment facilities shall be operated in a manner consistent with the following:

a. The facilities shall at all times be maintained in a good working order and operated as efficiently as possible. This includes but is not limited to effective performance based on design facility removals, adequate funding, effective management, adequate operator staffing and training, and adequate laboratory and process controls (including appropriate quality assurance procedures); and

b. Any maintenance of facilities, which might necessitate unavoidable interruption of operation and degradation of effluent quality, shall be scheduled during noncritical water quality periods and carried out in a manner approved by the Permit Issuing Authority.

c. The permittee, in order to maintain compliance with this permit shall control production and all discharges upon reduction, loss, or failure of the treatment facility until the facility is restored or an alternative method of treatment is provided.

5. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to waters of the United States resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature of the noncomplying discharge.

6. Bypassing

"Bypassing" means the intentional diversion of untreated or partially treated wastes to waters of the United States from any portion of a treatment facility. Bypassing of wastewaters is prohibited unless all of the following conditions are met:

a. The bypass is unavoidable-i.e. required to prevent loss of life, personal injury or severe property damage;

b. There are no feasible alternatives such as use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment down time;

c. The permittee reports (via telephone) to the Permit Issuing Authority any unanticipated bypass within 24 hours after becoming aware of it and follows up with written notification in 5 days. Where the necessity of a bypass is known (or should be known) in advance, prior notification shall be submitted to the Permit Issuing Authority for approval at least 10 days beforehand, if possible. All written notifications shall contain information as required in Part II (A)(3)(b); and

d. The bypass is allowed under conditions determined to be necessary by the Permit Issuing Authority to minimize any adverse effects. The public shall be notified and given an opportunity to comment on bypass incidents of significant duration to the extent feasible.

This requirement is waived where infiltration/inflow analyses are scheduled to be performed as part of an Environmental Protection Agency facilities planning project.

7. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering waters of the United States.

8. Power Failures

The permittee is responsible for maintaining adequate safeguards to prevent the discharge of untreated or inadequately treated wastes during electrical power failures either by means of alternate power sources, standby generators or retention of inadequately treated effluent. Should the treatment works not include the above capabilities at time of permit issuance, the permittee must furnish within six months to the Permit Issuing Authority, for approval, an implementation schedule for their installation, or documentation demonstrating that such measures are not necessary to prevent discharge of untreated or inadequately treated wastes. Such documentation shall include frequency and duration of power failures and an estimate of retention capacity of untreated effluent.

9. Onshore or Offshore Construction

This permit does not authorize or approve the construction of any onshore or offshore physical structures or facilities or the undertaking of any work in any waters of the United States.

B. RESPONSIBILITIES

1. Right of Entry

The permittee shall allow the Permit Issuing Authority and/or authorized representatives (upon presentation of credentials and such other documents as may be required by law) to:

a. Enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit;

b. Have access to and copy at reasonable times any records required to be kept under the terms and conditions of this permit;

c. Inspect at reasonable times any monitoring equipment or monitoring method required in this permit;

d. Inspect at reasonable times any collection, treatment, pollution management or discharge facilities required under the permit; or

e. Sample at reasonable times any discharge of pollutants.

2. Transfer of Ownership or Control

A permit may be transferred to another party under the following conditions:

a. The permittee notifies the Permit Issuing Authority of the proposed transfer;

b. A written agreement is submitted to the Permit Issuing Authority containing the specific transfer date and acknowledgement that the existing permittee is responsible for violations up to that date and the new permittee liable thereafter.

Transfers are not effective if, within 30 days of receipt of proposal, the Permit Issuing Authority disagrees and notifies the current permitttee and the new permittee of the intent to modify, revoke and reissue, or terminate the permit and to require that a new application be filed.

3. Availability of Reports

Except for data determined to be confidential under Section 308 of the Act, (33 U.S.C. 1318) all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State water pollution control agency and the Permit Issuing Authority. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Act (33 U.S.C. 1319).

4. Permit Modification

After notice and opportunity for a hearing, this permit may be modified, terminated or revoked for cause (as described in 40 CFR 122.15 et seq) including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;

c. A change in any condition that requires either temporary interruption or elimination of the permitted discharge; or

d. Information newly acquired by the Agency indicating the discharge poses a threat to human health or welfare.

If the permittee believes that any past or planned activity would be cause for modification or revocation and reissuance under 40 CFR 122.15 et seq, the permittee must report such information to the Permit Issuing Authority. The submission of a new application may be required of the permittee.

5. Toxic Pollutants

a. Notwithstanding Part II (B)(4) above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge authorized herein and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revoked and reissued or modified in accordance with the toxic effluent standard or prohibition and the permittee so notified.

b. An effluent standard established for a pollutant which is injurious to human health is effective and enforceable by the time set forth in the promulgated standard, even though this permit has not as yet been modified as outlined in Condition 5a.

6. Civil and Criminal Liability

Except as provided in permit conditions on "Bypassing", Part II (A) (6), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

7. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act (33 U.S.C. 1321).

8. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

9. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

10. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

11. Permit Continuation

A new application shall be submitted at least 180 days before the expiration date of this permit. Where EPA is the Permit Issuing Authority, the terms and conditions of this permit are automatically continued in accordance with 40 CFR 122.5, provided that the permittee has submitted a timely and sufficient application for a renewal permit and the Permit Issuing Authority is unable through no fault of the permittee to issue a new permit before the expiration date.

C. MONITORING AND REPORTING

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Reporting

Monitoring results obtained during each calendar month shall be summarized for each month and reported on a Discharge Monitoring Report Form (EPA No. 3320-1). Forms shall be submitted at the end of each calendar quarter and shall be postmarked no later than the 28th day of the month following the end of the quarter. The first report is due by the 28th day of the month following the first full quarter after the effective date of this permit.

Signed copies of these, and all other reports required herein, shall be submitted to the Permit Issuing Authority at the following address(es):

Permit Compliance Branch
Environmental Protection Agency
Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

3. Test Procedures

Test procedures for the analysis of pollutants shall conform to all regulations published pursuant to Section 304(h) of the Clean Water Act, as amended (40 CFR 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants").

4. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date, and time of sampling;

b. The person(s) who obtained the samples or measurements;

c. The dates the analyses were performed;

d. The person(s) who performed the analyses;

e. The analytical techniques or methods used; and

f. The results of all required analyses.

5. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form (EPA No. 3320-1). Such increased frequency shall also be indicated.

6. Records Retention

The permittee shall maintain records of all monitoring including: sampling dates and times, sampling methods used, persons obtaining samples or measurements, analyses dates and times, persons performing analyses, and results of analyses and measurements. Records shall be maintained for three years or longer if there is unresolved litigation or if requested by the Permit Issuing Authority.

D. DEFINITIONS

1. Permit Issuing Authority

The Regional Administrator of EPA Region IV or designee.

2. Act

"Act" means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act) Public Law 92-500, as amended by Public Law 95-217 and Public Law 95-576, 33 U.S.C. 1251 et seq.

3. Mass/Day Measurements

a. The "average monthly discharge" is defined as the total mass of all daily discharges sampled and/or measured during a calendar month on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such month. It is, therefore, an arithmetic mean found by adding the weights of the pollutant found each day of the month and then dividing this sum by the number of days the tests were reported. This limitation is identified as "Daily Average" or "Monthly Average" in Part I of the permit and the average monthly discharge value is reported in the "Average" column under "Quantity" on the Discharge Monitoring Report (DMR).

b. The "average weekly discharge" is defined as the total mass of all daily discharges sampled and/or measured during a calendar week on which daily discharges are sampled and/or measured divided by the number of daily discharges sampled and/or measured during such week. It is, therefore, an arithmetic mean found by adding the weights of pollutants found each day of the week and then dividing this sum by the number of days the tests were reported. This limitation is identified as "Weekly Average" in Part I of the permit and the average weekly discharge value is reported in the "Maximum" column under "Quantity" on the DMR.

c. The "maximum daily discharge" is the total mass (weight) of a pollutant discharged during a calendar day. If only one sample is taken during any calendar day the weight of pollutant calculated from it is the "maximum daily discharge". This limitation is identified as "Daily Maximum," in Part I of the permit and the highest such value recorded during the reporting period is reported in the "Maximum" column under "Quantity" on the DMR.

4. Concentration Measurements

a. The "average monthly concentration," other than for fecal coliform bacteria, is the concentration of all daily discharges sampled and/or measured during a calendar month on which daily discharges are sampled and measured divided by the number of daily discharges sampled and/or measured during such month (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. The average monthly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar month. This limitation is identified as "Monthly Average" or "Daily Average" under "Other Limits" in Part I of the permit and the average monthly concentration value is reported under the "Average" column under "Quality" on the DMR.

b. The "average weekly concentration," other than for fecal coliform bacteria, is the concentration of all daily discharges sampled and/or measured during a calendar week on which daily discharges are sampled and measured divided by the number of daily discharges sampled and/or measured during such week (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all samples collected during that calendar day. The average weekly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar week. This limitation is identified as "Weekly Average" under "Other Limits" in Part I of the permit and the average weekly concentration value is reported under the "Maximum" column under "Quality" on the DMR.

c. The "maximum daily concentration" is the concentration of a pollutant discharged during a calendar day. It is identified as "Daily Maximum" under "Other Limits" in Part I of the permit and the highest such value recorded during the reporting period is reported under the "Maximum" column under "Quality" on the DMR.

5. Other Measurements

   a. The effluent flow expressed as M^3/day (MGD) is the 24 hour average flow averaged monthly. It is the arithmetic mean of the total daily flows recorded during the calendar month. Where monitoring requirements for flow are specified in Part I of the permit the flow rate values are reported in the "Average" column under "Quantity" on the DMR.

   b. Where monitoring requirements for pH, dissolved oxygen or fecal coliform are specified in Part I of the permit the values are generally reported in the "Quality or Concentration" column on the DMR.

6. Types of Samples

   a. Composite Sample - A "composite sample" is any of the following:

      (1) Not less than four influent or effluent portions collected at regular intervals over a period of 8 hours and composited in proportion to flow.

      (2) Not less than four equal volume influent or effluent portions collected over a period of 8 hours at intervals proportional to the flow.

      (3) An influent or effluent portion collected continuously over a period of 24 hours at a rate proportional to the flow.

   b. Grab Sample: A "grab sample" is a single influent or effluent portion which is not a composite sample. The sample(s) shall be collected at the period(s) most representative of the total discharge.

7. Calculation of Means

   a. Arithmetic Mean: The arithmetic mean of any set of values is the summation of the individual values divided by the number of individual values.

   b. Geometric Mean: The geometric mean of any set of values is the Nth root of the product of the individual values where N is equal to the number of individual values. The geometric mean is equivalent to the antilog of the arithmetic mean of the logarithms of the individual values. For purposes of calculating the geometric mean, values of zero (0) shall be considered to be one (1).

c. Weighted by Flow Value: Weighted by flow value means the summation of each concentration times its respective flow divided by the summation of the respective flows.

8. Calendar Day

a. A calendar day is defined as the period from midnight of one day until midnight of the next day. However, for purposes of this permit, any consecutive 24-hour period that reasonably represents the calendar day may be used for sampling.

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OTHER REQUIREMENTS

A. No equipment containing polychlorinated biphenyl compounds shall be placed on site.

B. The instantaneous zone of thermal mixing for the cooling system shall not exceed an area of 9.5 acres. The temperature at the point of discharge into the St. Johns River shall not be greater than 105 degrees F. The temperature of the water at the edge of the mixing zone shall not exceed the limitations of Paragraph 17-3.05(1)(d).

C. Additional monitoring shall include: chloride; cyanide; sulfate; total, dissolved, settleable and suspended solids; and total aluminum, arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium, silver and zinc.

D. Subsequent to commercial operation dates of Units 1 and 2, respectively, the permittee shall conduct a detailed evaluation of actual water use and in-plant waste discharge to confirm design flow data. Reports of this evaluation shall cover a one-year period after start-up of each unit and shall be submitted not later than 15 months after commercial operation date of each unit. In the event that actual flow data are significantly different from design data, permit may be modified by the Director, Enforcement Division.

E. Permittee shall institute an evaluation of waste sources which contain or potentially contain high concentrations of oil and grease and by administrative procedure of facility construction shall remove oil and grease from such streams as close to the source as possible. Routine evaluation and sampling of oil separator effluents shall be included in this program.

F. Permittee shall maintain or obtain records of rainfall representative of plant site conditions. All periods of rainfall which exceed the 10-year, 24-hour event shall be reported to EPA.

G. No direct discharge from any solid waste storage area to waters of the U.S. is permitted by this Authorization to Discharge without prior approval by the Director, Enforcement Division, except as provided for OSN 009.

H. No direct discharge from the Blount Island Coal Handling Facility is permitted by this Authorization to Discharge.

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I. All periods of bypass of the Central Wastewater Treatment Facility from the Flow Splitter Box which result in a discharge to waters of the U.S. shall be reported and sampling of the Pump Sump discharge shall include all parameters noted in Part III.C, plus pH range. Written reports of such bypass shall be submitted monthly, except as required by Part II.A.3.c.

J. In accordance with Section 306(d) of the Clean Water Act (33 USC Section 1251, et seq.) effluent limitations based on standards of performance contained in this permit shall not be made any more stringent during a ten year period beginning on the date of completion of such construction or during the period of depreciation or amortization of such facility for the purposes of Section 167 or 169 (or both) of the Internal Revenue Code of 1954, whichever period ends first. The provisions of Section 306(d) do not limit the authority of the Environmental Protection Agency to modify the permit to require compliance with a toxic effluent limitation promulgated under BAT or toxic pollutant standard established under Section 307(a) of the Clean Water Act, or to modify, as necessary, to assure compliance with any applicable state water quality standard. If an applicable standard or limitation is promulgated under Sections 301(b)(2)(C) and (D), 304(b)(2), and 307(a)(2) and that effluent standard or limitation is more stringent than any effluent limitation in this permit or controls a pollutant not limited in this permit, this permit shall be promptly modified or revoked and reissued to conform to that effluent standard or limitation.

K. Not more than 12 months after the Commercial Operation Date of Unit 1, Permittee shall submit representative data as included in 40 CFR Part 122.53 (d)(7)(ii), (iii) and (iv). In the event that any pollutant is present at an unacceptable level, this permit shall be modified, or alternatively, revoked and reissued, to comply with any applicable provisions of the Clean Water Act.

L. No herbicides shall be used in the initial clearing operations of transmission line rights of way (ROW). Thereafter the use of herbicides for maintenance shall be minimized and shall be used in strict accordance with EPA-approved products and procedures.

M. During ROW clearing operations and transmission line tower construction, an undisturbed 25 feet wide buffer shall be maintained adjacent to all streams, rivers or lakes. Within this zone, selective topping of trees or removal of conflict trees which topping would otherwise kill is allowable but is to be done without disturbance of the root mat.

N. The Permittee shall comply with terms of a Memorandum of Agreement which will provide acceptable mitigation of adverse impacts to archaeological resources on the SJRPP site.*

* MOU to be negotiated and presented in Final EIS

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O. The Permittee shall line each on-site solid waste landfill area prior to active disposal operation at the landfill. If other than an impervious liner is employed, the permeabilities of the liner shall be on the order of $1x10^{-7}$ cm/second and a minimum of three feet in thickness. If a permeable liner material is selected, results of permeability tests by an independent testing laboratory are to be submitted to EPA no less than 90 days prior to landfill operations to document compliance with this requirement. Based on a minimum of two years of testing data of waste produced by SJRPP, Permittee may propose to EPA to use less stringent leachate controls.

P. The Permittee shall utilize solid waste disposal area "B", north of Island Drive, prior to clearing and utilization of disposal area "A".

Q. An undisturbed buffer zone approximately 200 feet in width shall be maintained between all construction activity areas and on-site wetlands contiguous with the St. Johns River or its tributaries. The buffer zone is to be defined by placement of a fence on the upland limit of this buffer zone as depicted on Figure 3.5-1 of the SAR/EIS. The buffer zone shall exist along the external southeast side of the plant rail loop.

R. The use of groundwater from the wellfield for plant service water for SJRPP shall be minimized to the greatest extent practicable but in no case shall exceed 7.6 mgd on a maximum daily basis or 5.1 mgd on an average basis. If it is determined that the FGD sludge can not be economically marketed as a gypsum product, the Permittee shall assess the feasability of using non-potable alternate water supplies to replace high quality groundwater in scrubber operation. The assessment is to be submitted to the EPA and must include specific water quality requirements of the scrubbers and levels of corrosive constituents in alternative water supplies.

S. After consultation with and approval from EPA, the Permittee shall institute a groundwater monitoring program as outlined in the State of Florida, Conditions of Certification, Sections II. B.2 and II. F.6. Monthly data shall be submitted quarterly to EPA commencing one year prior to commercial operation of Unit 1.

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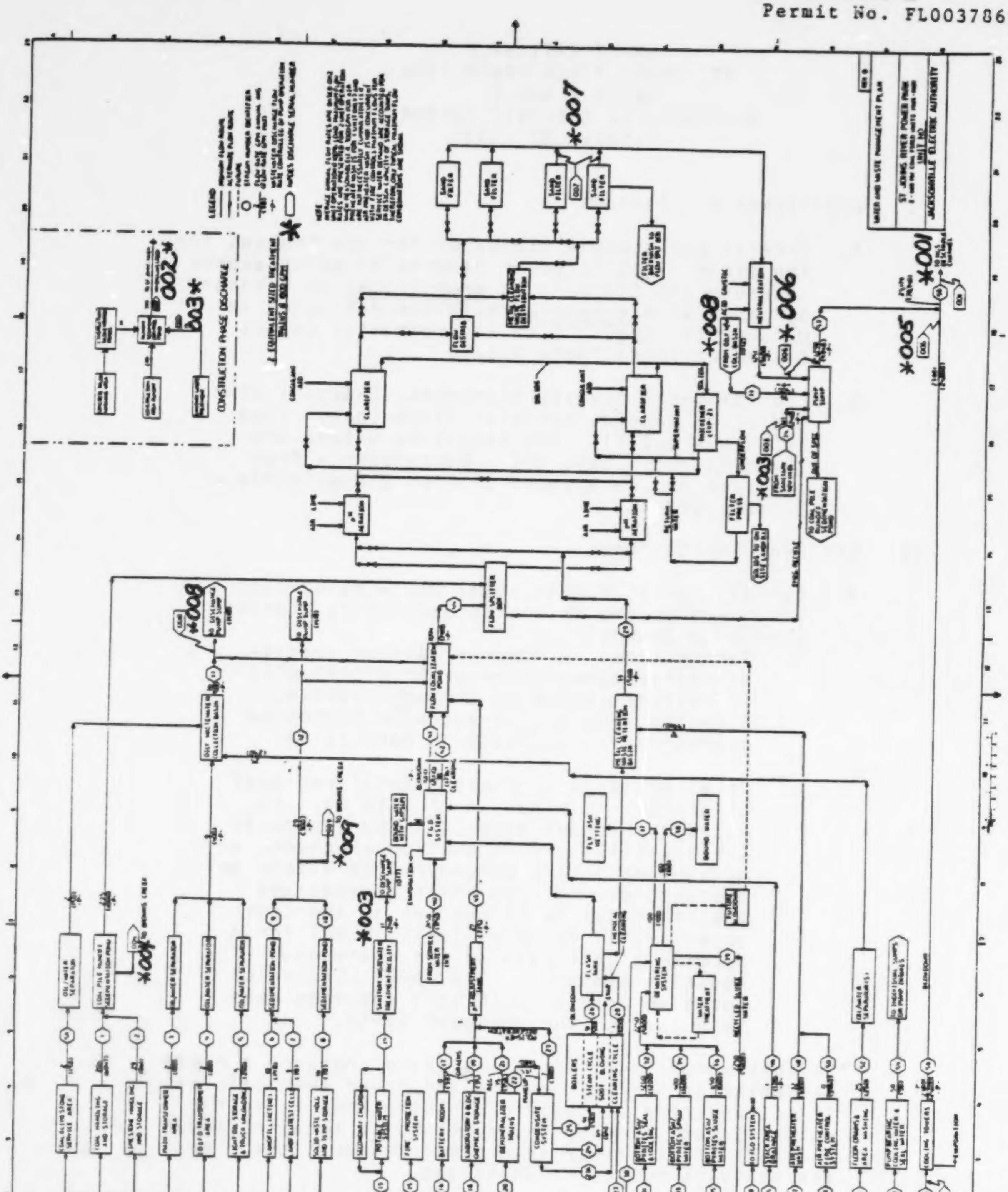
T. A bioassay test program shall be performed on the combined NGS/SJRPP discharge effluent (NPDES 001) commencing at the start of commercial operation of Unit 1. One 96-hour continuous flow-through test of the effluent is to be performed each quarter of the year. Quarterly testing reports are to be submitted to the EPA. Additionally, a monthly screening test (96-hour continuous flow-through bioassay) on the full strength effluent and a control is to be performed during the first year and reported quarterly. At the end of the first year, the monthly screening test may be discontinued upon receipt of EPA approval. Permittee shall submit a detailed study plan for the bioassay to EPA for review and approval at least six months prior to beginning the test program. The study plan shall propose methodology, indigenous test species, appropriate quality control measures and test program operators.

U. The Florida Department of Environmental Regulation has certified the discharge(s) covered by this permit with conditions (see Attachment B). Section 401 of the Act requires that conditions of certification shall become a condition of the permit. The monitoring and sampling shall be as indicated for those parameters included in the certification. Any effluent limits, and any additional requirements, specified in the attached state certification which are more stringent supersede any less stringent effluent limits provided herein. During any time period in which the more stringent state certification effluent limits are stayed or inoperable, the effluent limits provided herein shall be in effect and fully enforceable. (Note: Certification to be provided prior to permit issuance.)

Attachment A
Permit No. FL0037869


WATER AND WASTE MANAGEMENT PLAN
ST JOHNS RIVER POWER PARK
JACKSONVILLE ELECTRIC AUTHORITY
CONSTRUCTION PHASE DISCHARGE
LEGEND
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SAND FILTER
CLARIFIER
FILTER PRESS
PUMP SUMP
FLOW SPLITTER
FGD SYSTEM
COOLING TOWERS
SURFACE WATER
RAW WATER
STORAGE TANKS
GROUNDWATER

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PERMIT RATIONALE
ST. JOHNS RIVER POWER PARK
UNITS 1 AND 2
JACKSONVILLE ELECTRIC AUTHORITY

October 29, 1981

I. Applicable Regulations

A. Federal performance standards for new sources for the steam electric power generating point source category (40 CFR 423) as promulgated on October 8, 1974, with proposed revisions published on October 14, 1980. (See Environmental Impact Statement (EIS) Table 4.3-1)

B. Florida Water Quality Standards, Chapters 17-3 and 17-4, Florida Administrative Code. (See EIS Table 3.2-1). The receiving waters are classified as Class III - Recreation - Propagation and Management of Fish and Wildlife - Surface Waters.

II. Effluent Limitations

A. Outfall Serial Number (OSN) 001 - Main Plant Discharge to the Northside Generating Station Discharge Channel).

1. Temperature: A maximum 24-hour average discharge temperature of 33.9°C(93.0°F) is included based on the application. A mixing zone consistent with Northside discharges is included in Part III.B.

2. Total residual oxidants* (total residual chlorine): Limitation of 0.10 mg/l is based on Florida Water Quality Standards (17-4.244(4)). This section precludes a maximum pollutant concentration within an assigned mixing zone which exceeds the amount lethal to 50 percent of the test organisms in 96 hours (96-hr LC50) for a species significant to the indigenous aquatic community. The 96-hr LC50 value for Blue Crab of 0.10 mg/l has been used to establish the effluent limit.

*In salt water, addition of chlorine produces a rapid oxidation of iodine, bromine and other chemicals as it is converted to chloride. Therefore, in salt water systems, proper reference is to total residual oxidants (TRO) rather than total residual chlorine. The analysis method is unchanged.

B. OSN 002 - Runoff Sedimentation Control Pond discharge to Browns Creek (includes construction and yard drainage, effluent from Concrete Truck Washing Settling Pond, and Sanitary Wastewater Treatment Facility effluent).

1. Oil and Grease, Total Residual Chlorine and pH: Limitations are from Chapter 17-3.061 and -3.121 Florida Administrative Code.

2. Total Suspended Solids: Limitation is derived as a best professional judgement to protect sensitive benthic organisms in Browns Creek. See EIS for further discussions.

C. OSN 003 - Sanitary Wastewater Treatment Facility effluent. Limitations are generally based on secondary treatment requirements (40 CFR Part 102) for domestic waste. However, the one-day maximum, limitation of 60 mg/l each for total suspended solids and biochemical oxygen demand (BOD) proposed is extrapolated from the seven-day average limitation of 45 mg/l presented in the regulations. This extrapolation was made to conform with the proposed monitoring frequency.

D. OSN 004 and 009 - Coal Pile Runoff Sedimentation Pond overflow and Solid Waste Runoff Sedimentation Pond overflow, respectively, to Browns Creek. Overflows occur only during high intensity rainfall periods and requirements are based on best professional judgement.

E. OSN 005 - Cooling Tower Blowdown. Limitations are as required by promulgated 423.15(i) and (j), with proposed 423.15(j) and (k) requirements included as a best professional judgement for control of toxic and priority pollutants. NOTE: Due to the present design and proposed operation of the cooling tower system, it does not appear that the applicant can comply with total residual oxidant (chlorine) requirements of either the promulgated or proposed 40 CFR 423.15 without the use of dechlorination facilities. Various options are under consideration by the applicant (See the EIS for further discussions). In the event that compliance cannot be assured by the applicant, dechlorination will be required by the NPDES Permit when issued.

F. OSN 006 - Central Wastewater Treatment Facility effluent.

1. Limitations are as required by promulgated 423.15(c) for low volume wastes and 423.45 for coal pile runoff and proposed 423.15(c) and 423.15(l) and (m), respectively.

2. Concentration limitations:

   a. Total Suspended Solids: Thirty day average ("daily average") and 24-hour average ("daily maximum") values of 30 and 50 mg/l respectively have been included due to the combination of low volume waste and coal pile runoff (and other area runoff) for treatment in the Central Wastewater Treatment facility.

   b. Oil and grease limitations: Daily average and daily maximum values of 10 and 15 mg/l, respectively, have been included since there is no allowance for oil and grease in coal pile and area runoff while low volume wastes are limited to 15 and 20 mg/l, respectively. Limitations are based on a reduction in concentration which is approximately proportional to pump design capacities:

      15 or 20 mg/l times 2400 divided by 3400

      where 2400 gpm is the Flow Equilization Pond pump capacity and 3400 gpm is the combined capacity of the Flow Equilization Pond and Coal Pile Runoff Sedimentation Pond pumps (See Attachment B).

3. Quantity limitations: Calculations are based on the following formula:

   pounds per day = mg/l x MGD x 8.345

   where, 8.345 is the appropriate conversion factor

   0.454 pound/day = 1.0 kilogram/day (kg/day)

   MGD= Million gallons per day = gpm x 0.00144

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Flows MGD (gpm)	One Unit	Two Units
Flow Equilization Pond	0.79(547)	1.58(1094)
Coal Pile Runoff Sedimentation Pond	0.34(235)	0.34 (235)
Total	1.13(782)	1.91(1329)

Total Suspended Solids - Daily Average @ 30 mg/l

Kg/day (lb/day)	128(282)	217(479)
Use in Permit	130(280)	220(480)

Total Suspended Solids - Daily Maximum @ 50 mg/l

Kg/day (lb/day)	213(470)	362(799)
Use in Permit	210(470)	360(800)

Oil and Grease - Daily Average @ 15 mg/l for Flow Equilization Pond Only

Kg/day (lb/day)	45(99)	90(197)
Use in Permit	45(100)	90(200)

Oil and Grease - Daily Maximum @ 20 mg/l for Flow Equilization Pond Only

Kg/day (lb/day)	60(131)	119(263)
Use in Permit	60(130)	120(260)

4. Variance. Ambient levels of several parameters exceed Florida Water Quality Standards Criteria in the St. Johns River. Therefore, the addition of any of these pollutants (or concentration by the cooling towers), regardless of how little the concentration exceeds the ambient level and/or the state criterion, would technically violate the Water Quality Standards. The applicant has requested a variance to certain criteria and a mixing zone for others. The State of Florida and EPA are considering these requests. Pending completion of the variance hearing(s) and approval of any State variance by EPA, limitations will be included in the NPDES Permit when it is issued. Additional information on ambient conditions, expected effluent quality and variance discussions is included in the Environmental Impact Statement.

G. OSN 007 - Metal Cleaning Wastes. Limitations are as required by promulgated 423.15(f) and proposed 423.15(d), except that best professional judgement limitations for phosphate and chemical oxygen demand have been included.

H. OSN 008 - Oily Waste Collection Basin Effluent. Limitations are as required for promulgated and proposed 423.15(c) for low volume wastes. Quantity limitations have not been included due to the highly variable nature of the area runoff flows.

APPENDIX C

SECTION 10/404 PERMIT (DRAFT) (USCOE)
NOT AVAILABLE AT THIS TIME

APPENDIX D

FDER CONDITIONS OF CERTIFICATION (DRAFT)

10/5/81

State of Florida Department of Environmental Regulation
Jacksonville Electric Authority
SJRPP Units 1 & 2
PA 81-13

DRAFT COPY

CONDITIONS OF CERTIFICATION

I. Air

The construction and operation of SJRPP Units 1 & 2 at the Jacksonville steam electric power plant site shall be in accordance with all applicable provisions of Chapters 17-2, 17-4, 17-5 and 17-7, Florida Administrative Code. In addition to the foregoing, the permittee shall comply with the following conditions of certification:

A. Emission Limitations

1. Based on a maximum heat input of ~~4,330~~ 6.144 million BTU per hour, stack emissions from SJRPP Unit 1 & 2 shall not exceed the following when burning coal:

    a. SO_2 - 1.2 lb. per million BTU heat input, maximum two hour average, 0.76 lb/MMBtu on a 30-day rolling average.

    b. NO_x - 0.60 lb. per million BTU heat input.

    c. Particulates - 0.03 lb. per million BTU heat input.

    d. Visible emissions - 20% (6-minute average), except one 6-minute period per hour of not more than 27% opacity.

2. The height of the boiler exhaust stack for SJRPP Unit 1 & 2 shall not be less than 640 ft. above grade.

3. Particulate emissions from the coal handling facilities:

    a. The permittee shall not cause to be discharged into the atmosphere from any coal processing or conveying equipment, coal storage system or coal transfer and loading system processing coal, visible emissions which exceed 20 percent opacity. Particulate emissions shall be controlled by use of control devices.

    b. The permittee must submit to the Department within ten (10) working days after it becomes available, copies of technical data pertaining to the selected particulate emissions control for the coal handling

ENVIRONMENTAL IMPACT STATEMENT BRANCH
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OCT 14 1981
REGION IV - EPA

facility. These data should include, but not be limited to, guaranteed efficiency and emission rates, and major design parameters such as air/-cloth ratio and flow rate. The Department may, upon review of these data, disapprove the use of any such device if the Department determines the selected control device to be inadequate to meet the emission limits specified in 3(a) above. Such disapproval shall be issued within 30 days of receipt of the technical data.

4. Particulate emissions from limestone and flyash handling shall not exceed the following:

   a. Limestone silos - 0.050 lb/hr.

   b. Limestone hopper/transfer conveyors - 0.65 lb/hr.

   c. Flyash handling system - 0.2 lb/hr.

5. Visible emissions from the following facilities shall be limited to 5% opacity: (a) limestone and flyash handling system, (b) limestone day silos and (c) flyash silos.

6. Compliance with opacity limits of the facilities listed in Condition 5 will be determined by EPA reference method 9 (Appendix A, 40 CFR 60).

7. Construction shall reasonably conform to the plans and schedule given in the application.

8. The permittee shall report any delays in construction and completion of the project to the Department's St. Johns River Subdistrict Office.

9. Reasonable precautions to prevent fugitive particulate emissions during construction, such as coating of roads and construction sites used by contractors, will be taken by the permittee.

10. Coal should not be burned in the unit unless both electrostatic precipitator and limestone scrubber are operating properly.

11. Coal to be burned in the unit should be washed before it is transported to the plant site.

B. Air Monitoring Program

1. The permittee shall install and operate continuously monitoring devices for each boiler exhaust for sulfur dioxide, nitrogen ~~di~~oxide, ~~oxygen~~ and opacity. The

   CO + CO_2

monitoring devices shall meet the applicable requirements of Section 17-2.08, FAC, and 40 CFR 60.47a. The opacity monitor may be placed in the duct work between the electrostatic precipitator and the FGD scrubber.

2. The permittee or Jacksonville Bio-Environmental Services Division shall operate the two ambient monitoring devices for sulfur dioxide in accordance with EPA reference methods in 40 CFR, Part 53, and two ambient monitoring devices for suspended particulates. The monitoring devices shall be specifically located at a location approved by the Department. The frequency of operation shall be every six days commencing as specified by the Department.

3. The permittee shall maintain a daily log of the amounts and types of fuel used and copies of fuel analyses containing information on sulfur content, ash content and heating values.

4. The permittee shall provide stack sampling facilities as required by Rule 17-2.23(4) FAC and shall explicitly provide a safe and reliable elevator to the platform. The sampling probe liner shall be fabricated of material which can withstand flexing.

5. The ambient monitoring program may be reviewed by the Department and the permittee annually beginning two years after start-up of Unit 2.

6. Prior to operation of the source, the permittee shall submit to the Department a standardized plan or procedure that will allow the permittee to monitor emission control equipment efficiency and enable the permittee to return malfunctioning equipment to proper operation as expeditiously as possible.

C. Stack Testing

1. Within 60 calendar days after achieving the maximum capacity at which each unit will be operated, but no later than 180 operating days after initial start-up, the permittee shall conduct performance tests for particulates SO_2, NO_x, and visible emissions during normal operations near ~~4450~~ 6144 MMBtu/hr heat input and furnish the Department a written report of the results of such performance tests within 30 days of completion of the tests. The performance tests will be conducted in accordance with the provisions of 40 CFR 60.46a, 48a, and 49a.

2. Performance tests shall be conducted and data reduced in accordance with methods and procedures outlined in DER's Standard Sampling Techniques and Methods of Analysis for Determination of Air Pollutants From Point Source, July 1975

3. Performance tests shall be conducted under such conditions as the Department shall specify based on representative performance of the facility. The permittee shall make available to the Department such records as may be necessary to determine the conditions of the performance tests.

4. The permittee shall provide 30 days prior notice of the performance tests in order to afford the Department the opportunity to have an observer present.

5. Stack tests for particulates and SO_2 shall be performed annually in accordance with conditions C. 2, 3, and 4 above.

D. Reporting

1. For SJRPP, stack monitoring, fuel usage and fuel analysis data shall be reported to the Department's St. John's River Subdistrict Office on a quarterly basis commencing with the start of commercial operation in accordance with 40 CFR, Part 60, Section 60.7., and in accordance with Section 17-2.08, FAC.

2. Utilizing the SAROAD or other format approved in writing by the Department, ambient air monitoring data shall be reported to the Bureau of Air Quality Management of the Department quarterly. Commencing on the date of certification, such reports shall be due by the last day of the month following the quarterly reporting period.

3. Beginning one month after certification, the permittee shall submit to the Department a quarterly status report briefly outlining porgress made on engineering design and purchase of major pieces of equipment (including control equipment). All reports and information required to be submitted under this condition shall be submitted to the Administrator of Power Plant Siting, Department of Environmental Regulation, 2600 Blair Stone Road, Tallahassee, Florida, 32301.

II. Water Discharges

Any discharges into any waters of the State during construction and operation of SJRPP Units 1 & 2 shall be in accordance with all applicable provisions of Chapter 17-3, Florida Administrative Code, and 40 CFR, 423, Effluent Guidelines and Standards for Steam Electric Power Generating Point Source Category, except as provided herein. Also, the permittee shall comply with the following conditions of certification:

A. Plant Effluents and Receiving Body of Water

For discharges made from the power plant the following conditions shall apply:

1. Receiving Boby of Water (RBW)

The receiving body of water has been determined by the Department to be those waters of the St. John's River and any other waters affected which are considered to be waters of the State within the definition of Chapter 403, Florida Statutes.

2. Point of Dishcarge (P.O.D.)

The point of discharge will be determined by the Department to be where the effluent physically enters the waters of the State.

3. Thermal Mixing Zone

The instantaneous zone of thermal mixing for the cooling system shall not exceed an area of 9.5 acres. The temperature at the point of discharge into the St. John's River shall not be greater than 105 degrees F. The temperature of the water at the edge of the mixing zone shall not exceed the limitations of Paragraph 17-3.05(1)(d). Cooling tower blowdown shall not exceed 93^{0} F as a 24 hour average.

4. Chemical Wastes

All discharges of FGD blowdown and low volume wastes (demineralizer regeneration, floor drainage, lab drains and similar wastes) shall comply with Chapter 17-3. If violations of Chapter 17-3 occur, corrective action shall be taken. These wasteswaters shall be discharged to an adequately sized and constructed treatment facility. Low volume wastes, boiler preoperational and operational metal cleaning wastes, preheater wash, and stack wash shall be disposed of in an adequately sized treatment facility.

During periods when treated wastewater does not comply with pH discharge limitations, the treated wastewater may be recycled to the coal pile runoff sedimentation basin, except when the sedimentation basin has insufficient capacity to retain the recycled wastewater and the runoff from a rainfall event equal to or less than a ten year, 24 hour storm.

5. Coal Pile

Coal pile runoff shall be disposed of in the wastewater treatment system and shall not be directly discharged to surface waters. Discharge of stormwater runoff from the coal pile is allowed only during periods of high rainfall in excess of the ten year, 24 hour storm.

6. Chlorine

The concentration of total residual chlorine discharged from Units 1 & 2 shall not exceed 0.1 mg/l at the POD nor 0.01 mg/l beyond an instantaneous mixing zone of 1.0 acre. Chlorine from either unit at SJRPP shall not be discharged more than two hours per day and no unit shall be chlorinated simultaneously with any other unit at SJRPP or at Northside Generating Station. Levels of free available chlorine shall not exceed 0.5 mg/l for an instantaneous maximum nor 0.2 mg/l on a daily average in either cooling tower blowdown.

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7. pH

The pH of the combined discharges shall be such that the pH will fall within the range of 6.0 to 9.0.

8. Polychlorinated Biphenyl Compounds

There shall be no net discharge of polychlorinated biphenyl compounds.

9. Combined Low Volume Wastes and Coal Pile Runoff

The low volume wastes and coal pile runoff shall be treated to control pH, turbidity, solids and toxic metals prior to being discharged into the cooling water system. The following effluent limitations will apply:

Effluent	Daily Maximum	Maximum 30-Day Daily Average
TSS	50 mg/1	30 mg/1
Oil and Grease	15 mg/1	10 mg/1
pH	6-9	6-9

The design plans and specifications of the treatment system shall be submitted to the Department for review and approval prior to construction.

10. Metal Cleaning and Bottom Ash Sluice System Blowdown

Blowdown from the metal cleaning wastes and from the bottom ash sluice system shall be treated as appropriate prior to discharge to the cooling water system. The following effluent limitations shall apply:

Effluent	Daily Maximum	Maxmimum 30-Day Daily Average
TSS	100 mg/1	30 mg/1
Oil and Grease	20 mg/1	15 mg/1
pH	6-9	
Iron	1 mg/1	
Copper	1 mg/1	
PO_4	1 mg/1	
COD	100 mg/1	

11. Solid Waste and Limestone Storage Areas

There shall be no direct discharge of stormwater runoff to surface waters from the solid waste and limestone storage areas prior to treatment.

12. Storm Water Runoff

During plant operation, necessary measures shall be used to settle, filter, treat or absorb silt-containing or pollutant-laden stormwater runoff to limit the suspended solids to 50 mg/1 or less at the POD during rainfall periods less than the 10-year, 24-hour rainfall, and to prevent an increase in turbidity of more than 50 Jackson Turbidity Units above background in waters of the State beyond 50 meters from the POD at Station E 4500 and N 3712.

Control measures shall consist at the minimum of filters, sediment traps, barriers, berms or vegetative planting.

Exposed or disturbed soil shall be protected as soon as possible to minimize silt - and sediment-laden runoff. The pH shall be kept within the range of 6.0 to 8.5 at the POD.

13. Coal Unloading Facility Percolation Pond Overflow

There shall be no direct discharge to surface waters from the coal unloading facility wastewater treatment system percolation pond. Any discharge from the facility shall be reported to the Department and the Environmental Protection Agency. The quantity of flow and duration of flow shall be estimated.

14. Mixing Zones

The discharge of the following pollutants shall not violate the Water Quality Standards of Chapter 17-3, FAC, beyond the edge of the designated instantaneous mixing zones as described herein.

Pollutants	Mixing Zone	
Aluminum	$125,600^2$	31 Acres
Copper	$125,600^2$	31 Acres
Cyanide	$125,600^2$	31 Acres
Iron	$125,600^2$	31 Acres
Mercury	$125,600^2$	31 Acres
Silver	$125,600^2$	31 Acres
Oil and Grease	$125,600^2$	31 Acres
Selenium	80^2	0.02 Acres
Chlorides	80^2	0.02 Acres

15. Variances to Water Quality Standards

In accordance with the provisions of Sections 403.201 and 403.511(2), F.S., Jacksonville Electric Authority is hereby granted variances to the water Quality Standards of Chapter 17-3, F.A.C., for Aluminum, Copper, Iron and Mercury but only at such times as the natural background levels of the St. Johns River approach or exceed those standards. In any event, the discharge from the SJRPP shall comply with the effluent limitations set forth in paragraph II.A.16. The variance for mercury shall only be for two years, but may be extended by the Secretary pending results of monitoring data on wastewater treatment plant efficiency and ambient data.

16. Effluent Limitations

The following instantaneous maximum effluent limitations shall apply for Aluminum, Copper, Cyanide, Mercury, Silver, and Oil and Grease at the locations specified:

a. Cooling Tower Blowdown - Concentrations shall not exceed 1.5 times the concentrations present in the intake of the applicant's Northside Generating Station.

b. Wastewater Treatment Facility Discharge - Concentrations shall not exceed:

Aluminum	0.15 mg/l
Copper	1.0 mg/l
Cyanide	5. ug/l
Iron	1.0 mg/l
Mercury	41.1 ug/l
Silver	6.4 ug/l
Oil and Grease	20 mg/l

B. Water Monitoring Programs

The permittee shall monitor and report to the Department the listed parameters on the basis specified herein. The methods and procedures utilized shall receive written approval by the Department. The monitoring program may be reviewed annually by the Department, and a determination may be made as to the necessity and extent of continuation, and may be modified in accordance with Condition No. XXV.

1. Chemical Monitoring

The following parameters shall be monitored during discharge as shown, discharge commencing with the start of commercial operation of SJRPP and reported quarterly to the Department's St. Johns River Subdistrict Office:

Parameter	Location	Sample Type	Frequency
Flow, Groundwater	Wellfield Pipeline	Recorder	Continuous
Flow, Cooling	Intake	Pump Logs	Continuous
Flow, Cooling Tower Blowdown	Cooling Towers	Recorders	Continuous
Wastewater Flow	Prior to Pump Sump	Recorder	Continuous
Oily Wastewater Flow	Prior to Pump Sump	Recorder	Continuous
pH	Pump Sump Outfall to NGS	Recorder Grab	Continuous One/per week
Temperature	Outfall to NGS	Recorder	Continuous
TSS	Oily Waste Basin, Metal Cleaning Waste Facility, and Sewage Treatment Facility	Grab 24 Hour Composite " " "	Two/per week Two/per week " " " Monthly
Chlorine, Total Residual	Cooling Tower Blowdown Discharge to Browns Creek (During construction only)	Multiple Grab	Weekly
Oil and Grease	Oily Waste Basin Metal Cleaning Waste Facility Wastewater Treatment Facility	3 Grab Composite 24 Hour Composite 3 Grab Composite	Two/week One/day Two/week
Metals	Intake and Sump Pump	24 Hour Composite	Once/week for first six months, two/month for the next six months, then monthly thereafter
Aluminum	"		"
Copper	"		"
Cyanide	"		"
Iron	"		"
Mercury	"		"

Nickel	"		"
Selenium	"		"
Silver	"		"
Zinc	"		"
BOD	STP Influent and effluent	8 Hour Composite	Monthly
	Metal Cleaning Waste Facility	24 Hour Composite	Daily
PO_4	Metal Cleaning Facility	24 Hour Composite	Daily
Copper	" " "	" " "	"
Iron	" " "	" " "	"
Cycles-of-concentration	Cooling tower	Calcuation	"

2. Groundwater Monitoring

The groundwater levels shall be monitored continuously at wells as approved by the St. Johns River Water Management District. Chemical analyses shall be made on samples from all monitored wells identified in Condition III. F. below. The location, frequency and selected chemical analyses shall be as given in Condition III.F.

The groundwater monitoring program shall be implemented at least one year prior to operation of SJRPP Unit 1. The chemical analyses shall be in accord with the latest edition of Standard Methods for the Analysis of Water and Wastewater. The data shall be submitted within 30 days of collection/-analysis to the St. Johns River Water Management District and to the DER St. Johns River Subdistrict Office.

Conductivity and heavy metals shall be monitored in wells around all solid waste disposal sites, coal piles, and wastewater treatment and sedimentation ponds.

III. Groundwater

A. General

The use of groundwater from the wellfield for plant service water for SJRPP shall be minimized to the greatest extent practicable, but in no case shall exceed 7.6 mgd on a maximum daily basis from any new wells or 5.1 mgd on an average annual basis.

B. Well Criteria

The submission of well logs and test results and location, design and construction of wells to provide plant service water shall be in accordance with applicable rules of the Department of Evironmental Regulation and the St. Johns River Water Management District(SJRWMD). Total water use per month shall be reported quarterly to SJRWMD commencing with the start of construction.

C. Well Withdrawal Limits

JEA is authorized to make a combined average annual withdrawal of 5.1 million gallons of water per day with a maximum combined withdrawal rate not to exceed 7.6 million gallons during a single day. Withdrawals may be made from a wellfield consisting of up to four (4) wells whose locations are described in Figure__

After wells have been constructed, St. Johns River Water Management District may evaluate the individual wells and may recommend to the Department authorization of different withdrawals based upon hydrologic characteristics for the individual wells. The Department pursuant to Section 403.516, F.S. may modify the above withdrawal limitations with the concurrence of SJRWMD.

D. Water Use Restriction

Said water is restricted to uses other than main stream condensing. Any change in the use of said water will require a modification of this condition.

E. Emergency Shortages

In the event an emergency water shortage should be declared pursuant to Section 373.175 or 373.246, F.S., by St. Johns River Water Management District for an area including the location of these withdrawal points, the Department pursuant to Section 403.516, F.S., may alter, modify, or declare to be inactive, all or parts of Condition III. A.-G. An authorized Water Management District Representative, at any reasonable time, may enter the property to inspect the facilities.

F. Monitoring and Reporting

JEA shall, within the time limits hereinafter set forth, complete the following items, and if it fails to complete them by the specified time, the Condition III. A.-G. shall automatically become null and void.

JEA

1. ~~FPC~~ shall install flow meters in compliance with SJRWMD specifications on all production wells.

2. JEA shall submit to SJRWMD, on forms available from the District, a record of pumpage for each meter installed in F.1. above. Said pumpage shall be provided on a monthly basis, and shall be submitted by April 15, July 15, October 15, and January 15 for each preceding calendar quarter.

3. JEA shall maintain and operate a continuous water level recorder on the standby production well located at the test site in Duval County, Florida. Detailed hydrographs of water level fluctuations shall be constructed with the data collected from the water level recorder and shall be submitted to SJRWMD by April 15, July 15, October 15, and January 15 for each preceding calendar quarter.

4. Water quality analysis shall be performed on water withdrawn from each production well. The water samples collected from each of the wells shall be collected immediately after removal by pumping of a quantity of water equal to two casing volumes. The JEA and staff of SJRWMD may determine and adjust the intervals to be monitored in accordance with hydrologic conditions determined from drilling logs. The water quality analyses shall be performed monthly during the first year of operation, four times (January, May, September, and December) during the second year and twice each year (May and September) thereafter. Results shall be submitted to SJRWMD by the fifteenth (15th) day of the month following the month during which such analyses were performed. Testing for the following constituents is required:

Calcium
Potassium
Chloride
Specific conductance
Radium 226 (only if gross Alpha is greater than 15 pci/l)
Magnesium
Bicarbonate
Nitrate
Gross Alpha
Radiation
Sodium
Sulfate
Total Dissolved Solids
Total Phosphate

The design and location of monitoring wells shall be as indicated by the attached Figure or as modified by the staff of SJRWMD.

5. In the event that SJRWMD determines there is a significant change in the water quality, the Department pursuant to Section 403.516, F.S., may require the permittee to reduce or cease withdrawal from these groundwater sources.

6. After consulation with the DER and SJRWMD, JEA shall install a monitoring well system as generally shown on Figure 3 to monitor groundwater quality in the top 55 feet of surficial aquifer. One well shall be installed to a depth greater than 55 feet, but less than 90 feet, to monitor vertical dispersion or groundwater contaminants. Monitoring well locations and designs shall be submitted to the Department and SJRWMD for review. Monitoring wells shall be installed upgradient and downgradient from each solid waste disposal area, each liquid waste pond and each coal pile storage area. An additional monitoring well will be placed immediately downgradient of the first section of each solid waste landfill to be utilized. Approval or disapproval of the locations and design shall be granted within 60 days. The water samples collected from each of the monitor wells shall be collected immediately after removal by pumping of a quantity of water equal to two casing volumes. The water quality analyses shall be performed monthly during the year prior to commercial operation and two years after operation and quarterly thereafter. Results shall be submitted to the Department and the SJRWMD by the fifteenth (15th) day of the month following the month during which such analyses were performed. Testing for the following constituents is required:

TDS

Conductance

pH

Redox

Dissolved Oxygen

Temperature

Color

Cadmium

Zinc

Copper

Nickel

Selenium

Chromium

Arsenic

Turbidity

Chloride

Iron

Aluminum

Beryllium

Mercury

Lead

Gross Alpha

G. Minimum Water Level Restrictions

The Department and SJRWMD may, at a future date pursuant to Section 403.516, F.S., establish a minimum water level in the aquifer or aquifers hydrologically associated with these withdrawals, which may require JEA to reduce or cease withdrawal from these groundwater sources at times when water levels fall below these minimums.

H. Leachate

1. Zone of Discharge

Leachate from the solid waste landfills, sludge disposal test cells, coal storage piles, wastewater treatment ponds, or sedimentation ponds shall not contaminate waters of the State (including both surface and groundwaters) in excess of the limitations of Chapter 17-3, FAC., beyond the boundary of a zone of discharge extending 200 feet from the edge of the landfill or ponds.

2. Corrective Action

When the groundwater monitoring system shows a violation of the groundwater water quality standards of Chapter 17-3, FAC., the appropriate ponds, FGD landfill, or coal pile shall be sealed, relocated or closed, or the operation of the affected facility shall be altered in such a manner as to assure the Department that no violation of the groundwater standards will occur beyond the boundary of the site.

IV. Control Measures During Construction

A. Stormwater Runoff

During construction, appropriate measures shall be used to settle, filter, treat or absorb silt-containing or pollutant-laden stormwater runoff to limit the suspended solids to 50 mg/l or less at the POD during rainfall periods less than the 10-year, 24 hour rainfall, and to prevent an increase in turbidity of more than 50 Jackson Turbidity Units above background in waters of the State beyond 50 meters from the POD to Browns Creek. Oil and grease shall not exceed 5 mg/l at the discharge from the runoff sediment control pond.

Control measures shall consist at the minimum of filters, sediment traps, barriers, berms or vegetative planting. Exposed or disturbed soil shall be protected as soon as possible to minimize silt- and sediment-laden runoff. The pH shall be kept within the range of 6.0 to 8.5 at the POD.

Final drainage plans illustrating all stormwater treatment facilities and conveyances for construction phases and ultimate operations for both the entire St. Johns River Power Park site and the Blount Island coal site shall be submitted to the St. Johns River Subdistrict Manager and the St. Johns River Water Management District for review and approval prior to construction.

Stormwater drainage to Brown's Creek and Brown's Creek proper shall be monitored as indicated below beginning twelve (12) months prior to the commencement of construction and continuing throughout construction:

Monitoring Point	Parameters	Frequency	Sample Type
*Stormwater drainage to Brown's Creek from existing borrow pit in southeast portion of site	BOD5, COD, suspended solids, turbidity, dissolved oxygen, pH, TKN, Total phosphorus, Fecal Coliform, Total Coliform,	Twice Monthly	Grab
	oil and grease	Once/Week	Grab
*West Fork of Brown's Creek at Point Downstream from entry of of stormwater from Power Park site by way of a borrow pit	BOD5, COD, suspended solids, turbidity, dissolved oxygen, pH, TKN, Total phosphorus, fecal coliform, Total coliform	Twice Monthly	Grab

*Monitoring shall be conducted at suitable points for allowing a compparision of the characteristics of pre-construction and construction phase drainage and receiving waters.

B. Sanitary Wastes

Disposal of sanitary wastes from construction toilet facilities shall be in accordance with applicable regulations of the Department and appropriate local health agency. The sewage treatment plant shall be operated in accordance with Chapters 17-3, 17-6, 17-16, and 17-19, FAC. The discharge of total residual chlorine to Brown's creek shall not exceed 0.01 mg/l.

C. Environmental Control Program

An environmental control program shall be established under the supervision of a qualified person to assure that all construction activities conform to good environmental practices and the applicable conditions of certification.

The permittee shall notify the Department by telephone if unexpected harmful effects or evidence of irreversible environmental damage are detected during construction, shall immediately report in writing to the Department and shall within two weeks provide an analysis of the problem and a plan to eliminate or significantly reduce the harmful effects or damage and a plan to prevent reoccurrence.

D. Construction Dewatering Effluent

Construction dewatering effluent shall be treated when appropriate to limit surface water discharges of suspended solids to no more than 50 mg/l. The discharge of construction dewatering liquids shall not cause turbidity in excess of 50 Jackson Turbidity Units above ambient beyond a 20 meter radius from the point of discharge. Weekly grab samples will be collected and analyzed for suspended solids.

A program for controlling the groundwater impacts of construction dewatering shall be submitted to the Department and the St. Johns River Water Management District for review prior to implementation.

V. Solid Wastes

Solid wastes resulting from construction or operation shall be disposed of in accordance with the applicable regulations of Chapter 17-7, FAC. The permittee shall submit a program for approval outlining the methods to be used in handling and disposal of solid wastes. Such program shall indicate at the least methods for erosion control, covering, vegetation and quality control.

Open burning in connection with land clearing shall be in accordance with Chapter 17-5, FAC. No additional permits shall be required, but the Division of Forestry shall be notified prior to burning. Open burning shall not occur if the Division of Forestry has issued a ban on burning due to fire hazard conditions.

VI. Operation Safeguards

The overall design, layout, and operation of the facilities shall be such as to minimize hazards to humans and the environment. Security control measures shall be utilized to prevent exposure of the public to hazardous conditions. The Federal Occupational Safety and Health Standards will be complied with during construction and operation. The Safety Standards specified under Section 440.56, F.S., by the Industrial Safety Section of the Florida Department of Commerce will also be complied with.

VII. Screening

The permittee shall provide screening of the site through the use of aesthetically acceptable structures, vegetated earthen walls and/or existing or planted vegetation.

VIII. Potable Water Supply System

The potable water supply system shall be designed and operated in conformance with Chapter 17-22, FAC. Information as required in 17-22.108 shall be submitted to the Department prior to construction and operation. The operator of the potable water supply system shall be certified in accordance with Chapter 17-16, FAC.

IX. Transformer and Electric Switching Gear

The foundations for transformers, capacitors, and switching gear necessary to connect SJRPP Units 1 & 2 to the existing distribution system shall be constructed of an impervious material and shall be constructed in such a manner as to allow complete collection and recovery of any spills or leakage of oily, toxic, or hazardous substances.

X. Toxic, Deleterious, or Hazardous Materials

The spill of any toxic, deleterious, or hazardous materials shall be reported in the manner specified by Condition XV.

XI. Construction in Waters of the State

A. No construction on sovereign submerged lands shall commence without obtaining lease or title from the Department of Natural Resources.

B. Construction of intake and discharge structures, coal unloading wharf, and transmission towers shall be done in a manner to minimize turbidity. Turbidity screens should be used to prevent turbidity in excess of 50 JTUs above background beyond 150 meters from the dredging, pile driving, or construction site.

All spoil from connecting the SJRPP intake/discharge system to the NGS, and the coal unloading wharf shall be piped hydraulically or tucked to an upland disposal site of sufficient capacity to retain all material. Spoil from construction access canals shall be side cast and used for restoring natural bottom contours upon completion of construction.

C. Variances

1. A variances to the provisions of Section 17-3.061(h) for lead and Section 17-3.121(27) for silver for a period of twelve months commencing on the start of dredging activities are granted in accordance with Sections 403.201(1)(c) and 403.511(2), F.S. at the coal unloading facility wharf site on Blount Island. Concentrations of at the boundary of a 150 meter radius mixing zone shall not exceed the following:

Lead	62 μg/l
Silver	6.1 μg/l

2. Variances to the provisions of Sections 17-3.121(9) for Cadmuim, 17-3.061(h) for lead, 17-3.121(18) for mercury and 17-3.121(27) for silver are granted pursuant to the provisions of Sections 403.201(1)(c) and 403.511(2), F.S. at the spoil area site overflow for a period of twelve months starting with commencement of dredging activities concentrations at the boundary of a 150 meter radius mixing zone shall not exceed the following:

Cadmium	8.2 μg/l
Mercury	0.2 μg/l
Lead	62 μg/l
Silver	6.1 μg/l

D. Mixing Zones

During dredging activities mixing zone radii are designated for the following parameters:

Parameter	Distance to Edge of Mixing Zone[3] (m)
Aluminum	150
Antimony	18
Cadmium	150

Copper	150
Cyanide	19
Iron	150
Lead	150
Mercury	150
Oil and Grease	25
Silver	150

XII. Solid Waste Landfill

A. The proposed solid waste landfill area shall be monitored and studied pursuant to a detailed groundwater testing and monitoring Program as defined in Condition III, F.G. The results of the program will be used by the Department in determining whether JEA has affirmatively demonstrated that Florida Water Criteria (Chapter 17-3, F.A.C.) will not be violated.

B. JEA shall either provide an impermeable liner under the solid waste disposal areas or shall utilize a chemical fixation process, stablization or other approved methods to control leachate from the solid waste. JEA may implement a test program to demonstrate the quality and quantity of leachate from an unlined or untreated waste. Upon an affirmative showing that an uncontrolled solid waste facility will not cause violation of groundwater quality criteria, the Department may approve use of non-lined or non-chemically fixed landfill cells.

C. JEA shall utilize solid waste disposal area "B", north of Island Drive or the area previously designated for the bottom ash pond, prior to using disposal area "A".

D. Construction of perimeter berms shall be in conformance with the provisions of Chapter 17-9, F.A.C., regarding earthen dams.

E. Prior to the commencement of operation of solid waste disposal areas the following shall be submitted to the St. Johns River Subdistrict Manager for review and approval:

(1) Plot plan - should be drawn on a scale not greater than 200 ft. to the inch showing the following:

a. Dimensions and legal description of the site.

b. Location and depth corrected to MSL of soil borings.

c. Proposed trenching plan.

d. Cover stock piles.

   e. Fencing or other measures to restrict access.

   f. Cross sections showing both original and proposed fill elevation.

   g. Location, depth corrected to MSL and construction details of monitoring wells.

(2) Design Drawings and Maps - may be combined with plot plan and should be drawn on a scale not greater than 200 ft. to the inch showing the following:

   a. Topographic map with five foot contour intervals.

   b. Proposed fill area.

   c. Borrow area.

   d. Access roads.

   e. Grades required for proper drainage.

   f. Typical cross sections of disposal site including lifts, borrow areas and drainage controls.

   g. Special drainage devices.

(3) Soil map, Interpretive Guide Sheets, and a report giving the suitability of the site for such an operation.

(4) Contingency plan, including waste handling and disposal methods, in case of an emergency such as equipment failure, natural disaster or fire.

(5) Operation plans to direct and control the use of the site.

(6) An indication by discussion or drawings or both of how the site is designed to meet water quality standards of Chapter 17-3 and 17-4 FAC at the waste site boundary as the zone of discharge.

Based on the Department's reviews of the above, additions to or modifications of the overall monitoring program may be required for monitoring of runoff, groundwaters, and surface waters which may be affected by the various landfilling operations.

XIII. Transmission Lines

A. General

1. Filling and construction in water of the State shall be minimized to the extent practicable. No such activities shall take place without obtaining lease or title from the Department of Natural Resources where required. Construction and access roads should avoid wetlands and be located in surrounding uplands.

2. Placement of fill in wetland areas shall be minimized by spanning such areas with the maximum span practicable.

3. Any fill required in wetlands for construction but not required for maintenance purposes shall be removed and the ground restored to its original contours after transmission line placement.

4. Where fill in wetlands is necessary for access, keyhole fills from upland areas should be oriented as nearly parallel to surface water flow lines as possible.

5. Sufficient size and number of culverts or other structures shall be placed through fill causeways to maintain substantially unimpaired sheet flow.

6. Turbidity control measures, including but not limited to hay bales, turbidity curtains, sodding, mulching and seeding, shall be employed to prevent violation of water quality standards.

7. The Right-of-Way shall be located so as to minimize impacts in or on stream beds such as the removal of vegetation, to the extent practicable. Within 25 feet of the banks of any streams, rivers, or lakes, vegetation shall be left undisturbed, except for selective topping of trees or removal of trees which topping would kill. If it is necessary to remove such trees within 25 feet of the banks of streams, rivers, or lakes, the root mat shall be left undisturbed.

8. For all construction activities in waters of the state to their landward extent as defined in 17-4.28 which are also within the jurisdiction of the Corps of Engineers, the permittee shall file a copy of its Dredge/Fill application with the Corps of Engineers and with the DER, Bureau of Permitting, Power Plant Siting Section. For construction activities in waters of the State which are not also subject to the Corps, the permittee shall file

substantially similar information. In either case, within 45 days of filing DER shall determine whether or not a probable violation of the conditions of certification would occur if the plans were executed as filed. If DER determines that a probable violation would occur, it shall so notify the permittee. Construction shall not commence without a written statement of compliance. Since certification is the only form of permit required by the State, it is understood that the permittee and DER shall strive to resolve such matters by mutual agreement. If mutual agreement cannot be reached, as determined by the permittee, then the matter shall be referred to a Hearing Officer for disposition in accordance with the provisions of Chapter 120, Florida Statutes, within 60 days. Referral of an issue to a Hearing Officer pursuant to this condition shall not affect other conditions, nor shall it operate as a stay on any other portion of the line.

9. Any necessary water quality certifications which must be made to the Corps of Engineers shall be made at the time of a finding of compliance for specific work at specific locations.

10. Construction activities should proceed as much as practicable during the dry season.

B. Other Construction Activities

1. Maintenance roads under control of the permittee shall be planted with native species to prevent erosion and subsequent water quality degradation where drainage from such roads would impact waters of the State significantly.

2. Good environmental practices such as described in Environmental Criteria for Electric Transmission Systems as published by the U.S. Department of Interior and the U.S. Department of Agriculture shall be followied to the extent practicable.

3. Compliance with the most recent version of the National Electric Safety Code adopted by the Public Service Commission is required.

4. Fences running parallel to the transmission line which may become conductive shall be grounded at appropriate intervals; fences running perpendicular to the line shall be grounded at the edge of the right-of-way.

5. Field reconnaissance of rare and endangered species shall be performed in order to maximize avoidance of impacts on these species.

6. Open burning in connection with land clearing shall be in accordance with the applicable rules of the Department of Agriculture and Consumer Services. No additional permits shall be required, but the Division of Forestry shall be notified prior to burning. Open burning shall not occur if the Division of Forestry has issued a ban on burning due to fire hazard conditions.

C. Maintenance

1. Vegetative clearing operations for maintenance purposes to be carried out within the corridor shall follow the general standards for clearing right-of-way for overhead transmission lines as referenced in Sections XIII. A.7. and XIII.B.2. Selective clearing of vegetation is preferred over clearing and grubbing or clear cutting.

2. If chemicals or herbicides are to be used for vegetation control, the name, type, proposed use, locations, and manner of application shall be provided to the Department prior to their application for assessment of compliance with applicable regulations.

D. Archaeological Sites

Any archaeological sites discovered during construction of the transmission lines shall be disturbed as little as possible and such discovery shall be communicated to the Department of State, Division of Archives, History and Record Management (DAHRM). Potentitally affected areas will be surveyed, and if a significant site is located, the site shall be avoided, protected, or excavated as directed by DAHRM.

E. Road Crossing

For all locations where the transmission line will cross State highways, the applicant will submit materials pursuant to the Department of Transportion's (DOT) "Utility Accomodation Guide" to DOT's district office for review and approval. All applicable regulations pertaining to roadway crossings by transmission lines shall be complied with.

F. Emergency Reporting

Emergency replacement of previously existing right-of-way or transmission lines shall not be considered a modification prusuant to Section 403.5315, F.S. A verbal report of the emergency shall be made to the Department as soon as possible. Within fourteen (14) calendar days after correction of the emergency, a report to the Department shall be made outlining the details of the emergency and the steps taken for its temporary relief. The report shall be a written description of all of the work performed and shall set forth any pollution control measures or mitigative measures which were utilized or are being utilized to prevent pollution of waters, harm to sensitive areas or alteration of archaeological or historical resources.

G. Final Right-of-Way Location

A map of 1:24000 scale showing final location of the right-of-way shall be submitted to the Department upon completion of acquisition.

H. Compliance

Construction and maintenance shall comply with the applicable rules and regulations of the Department and those agencies specified in 17-17.54(2)(a) and (b), FAC.

XIV. Change in Discharge

All discharges or emissions authorized herein shall be consistent with the terms and conditions of this certification. The discharge of any pollutant not identified in the application or any discharge more frequent than, or at a level in excess of, that authorized herein shall constitute a violation of the certification. Any anticipated facility expansions, production increases, or process modification which will result in new, different or increased discharges or expansion in steam generating capacity will require a submission of new or supplemental application pursuant to Chapter 403, F.S.

XV. Non-Compliance Notification

If, for any reason, the permittee does not comply with or will be unable to comply with any limitation specified in this certification, the permittee shall notify the manager of DER's St. Johns River subdistrict office by telephone during the working day in which permittee becomes aware of said non-compliance and shall confirm this situation in writing within seventy-two (72) hours supplying the following information:

a. A description and cause of non-compliance; and

b. The period of non-compliance, including exact dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the non-complying event.

XVI. Facilities Operation

The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this certification. Such systems are not to be bypassed without prior Department approval. The one exception is that during periods when light oil is used for ignition, the FGD system may be bypassed.

XVII. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact resulting from non-compliance with any limitation specified in this certification, including, but not limited to, such accelerated or additional monitoring as necessary to determine the nature and impact of the non-complying event.

XVIII. Right of Entry

The permittee shall allow the Secretary of the Florida Department of Environmental Regulation and/or authorized representatives, upon the presentation of credentials:

a. To enter upon the permittee's premises where an effluent source is located or in which records are required to be kept under the terms and conditions of this permit; and

b. to have access to and copy all records required to be kept under the conditions of this certification; and

c. to inspect and test any monitoring equipment or monitoring method required in this certification and to sample any discharge or pollutants; and

d. to assess any damage to the environment or violation of ambient standards.

XIX. Revocation or Suspension

This certification may be suspended or revoked pursuant to Section 403.512, Florida Statutes, or for violations of any Condition of Certification.

XX. Civil and Criminal Liability

This certification does not relieve the permittee from civil or criminal responsibility or liability for non-compliance with any conditions of this certifiation, applicable rules or regulations of the Department, or Chapter 403, Florida Statutes, or regulations thereunder.

Subject to Section 403.511, Florida Statutes, this certification shall not preclude the institution of any legal action or relieve the permittee from any responsibilities or penalties established pursuant to any other applicable State Statutes or regulations.

XXI. Property Rights

The issuance of this certification does not convey any property rights in either real or personal property, tangible or intangible, nor any exclusive privileges, nor does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations. The applicant will obtain title, lease or right of use to any sovereign submerged lands occupied by the plant, transmission line structures, or appurtenant facilities from the State of Florida.

XXII. Severability

The provisions of this certification are severable, and, if any provision of this certification or the application of any provision of this certification to any circumstances is held invalid, the application of such provision to other circumstances and the remainder of the certification shall not be affected thereby.

XXIII. Definitions

The meaning of terms used herein shall be governed by the definitions contained in Chapter 403, Florida Statutes, and any regulation adopted pursuant thereto. In the event of any dispute over the meaning of a term used in these general or special conditions which is not defined in such statutes or regulations, such dispute shall be resolved by reference to the most relevant definitions contained in any other state or federal statute or regulation or, in the alternative, by the use of the commonly accepted meaning as determined by the Department.

XXIV. Review of Site Certification

The certification shall be final unless revised, revoked or suspended pursuant to law. At least every five years from the date of issuance of this certification or any National Pollutant Discharge Elimination System Permit issued pursuant to the Federal Water Pollution Control Act Amendments of 1972 for the plant units, the Department shall review all monitoring data that has been submitted to it during the proceeding five-year period for the purpose of determining the extent of the permittee's compliance with the conditions of this certification of the environmental impact of this facility. The Department shall submit the results of its review and recommendations to the permittee. Such review will be repeated at least every five years thereafter.

XXV. Modification of Conditions

The conditions of this certification may be modified in the following manner:

A. The Board hereby delegates to the Secretary the authority to modify, after notice and opportunity for hearing, any conditions pertaining to consumptive use of water, monitoring, sampling, groundwater, mixing zones, zones of discharge, leachate control programs or variances to water quality standards.

B. All other modifications shall be made in accordance with Sections 403.516, Florida Statutes.

XXVI. Flood Control Protection

The plant and associated facilities shall be constructed in such a manner as to comply with the Duval County flood protection requirements.

XXVII. Effect of Certification

Certification and conditions of certification are predicated upon design and performance criteria indicated in the application. Thus, conformance to those criteria, unless specifically amended, modified, or as the Department and parties are otherwise notified, is binding upon the applicant in the preparation, construction and maintenance of the certified project. In those instances where a conflict occurs between the application's design criteria and the conditions of certification, the conditions shall prevail.

XXVIII. Noise

To mitigate the effects of noise produced by the steam blowout of steam boiler tubes, JEA shall conduct public awareness campaigns prior to such activities to forewarn the public of the estimated time and duration of the noise.

XIX. Archaeological Sites

The following archaeological sites shall be preserved whenever possible. If they must be altered by construction, then archaeological salvage excavation shall be performed prior to construction under the supervision of the Florida Department of State, Division of Archives, History and Records Management.

Site - 8Du669 8Du670

8Du671 8Du673

8Du674 8Du675

8Du677 8Du678

XXXI. Blount Island Coal Unloading Facility

Area drainage and rainfall runoff from the lined coal pile on Blount Island shall be directed to a lined treatment system designed to process the runoff from the 24-hour, ten-year storm. Wastewater treatment shall consist of as a minimum: removal of solids and metals by precipitation and sedimentation followed by pH adjustment to no less than 8.0 and final disposal by percolation. Sufficient capacity shall be provided to allow for accumulation of settled solids of up to 20 percent of the total pond volume. Solids removed from the sedimentation pond shall be disposed in a properly designed landfill.

The sedimentation pond liner shall be impervious and designed for the life of the facility. The liner shall be installed in such a manner as to prevent rupture during cleaning or removal of solids.